INSTALLATION MANUAL

MEMORY ADAPTERS
FOR
KWM-380/HF-380 TRANSCEIVERS

Includes Installation Instructions

for

KPI-380 Keypad Interface

Kiron Corporation
1516 Essex Road
Columbus, OH 43221
614-486-5746

PRODUCT WARRANTY

To the original owner, KIRON CORPORATION warrants the KIRON Memory Adapter to be free of defects in materials or workmanship for a period of six months from the date of purchase.

The warranty registration card must be submitted within 10 days of the date of purchase in order to obtain warranty service. All units returned for repair must have prior authorization from KIRON. A return authorization number may be obtained by phone or letter. All returns must be shipped prepaid. Repaired units will be returned with shipping paid by us using normal surface shipping carriers (UPS or US Postal Service).

This warranty does not apply to units which have been misused, or become defective through user modification, negligence, abuse and/or mishandling, or improper installation. KIRON assumes no responsibility for any damage to the radio to which this product is connected.

During the warranty period KIRON agrees to repair or replace, at our option, the Memory Adapter Board, without charge and within a reasonable time, any unit returned to us which upon examination is found to be defective under the terms of this warranty.

KIRON reserves the right to change any feature or specification of the product at any time without incurring obligation to previous purchasers.

In no event shall KIRON have any liability for incidental or consequential damages, or for loss, damage or expense directly or indirectly arising from the use of this product. (Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.)

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KIRON CORPORATION
Columbus, OH 43221

I. Introduction

Congratulations on your purchase of the Kiron Memory Adapter. There are three models of the memory adapters. The Model M1-A is for a standard KWM-380. The M3-A is also for a standard KWM-380 but provides increased transmit frequency coverage. The Model M2-A is for the HF-380 military transceiver or for a KWM-380 which has had an additional filter board (A3) installed. These matters are further explained in Appendix B of this manual. We suggest that you read this material now in order to verify that you have ordered the correct memory adapter for your particular radio.

This manual tells how to install the memory adapters and how to use the transceiver after the adapter is installed (some of the keypad operations are different).The manual also provides some additional information about the KWM-380/HF-380 transceivers and about the technology used in the KIRON memory adapters.

We are confident that our product will greatly enchance your enjoyment of your transceiver.

The installation is not difficult but needs to be done with care. We have written this manual for someone who has never opened the case of a KWM-380 or HF-380. On the other hand if you have, for example, installed a crystal filter in the transceiver you have all the skill needed for this job.

Even if you are a technician experienced in servicing these transceivers we suggest that you scan the following paragraphs and read with care any sections with which you are not familiar. Look especially at the cautionary statement in section V, the installation instructions in section VI, and the electrical testing procedures in section VIII.

II. Summary

When the dust cover is removed (see details below) you will find a large metal box on the left side which has a cover secured by 34 sheet metal screws. When this cover is removed you will see a series of circuit cards, held in place by card guides, and separated by brass shield partitions. The third slot from the front contains a full-width card called the control card (A8). Figure 1 shows the card locations.

The installation of the Kiron Memory Adapter consists simply of removing the control card, substituting the supplied circuit board for the ROM IC on the control card, and soldering three wires to the control card. In other words the Kiron board mounts piggyback style to the control card.

III. Order of Procedures

The installation description consists of five parts:

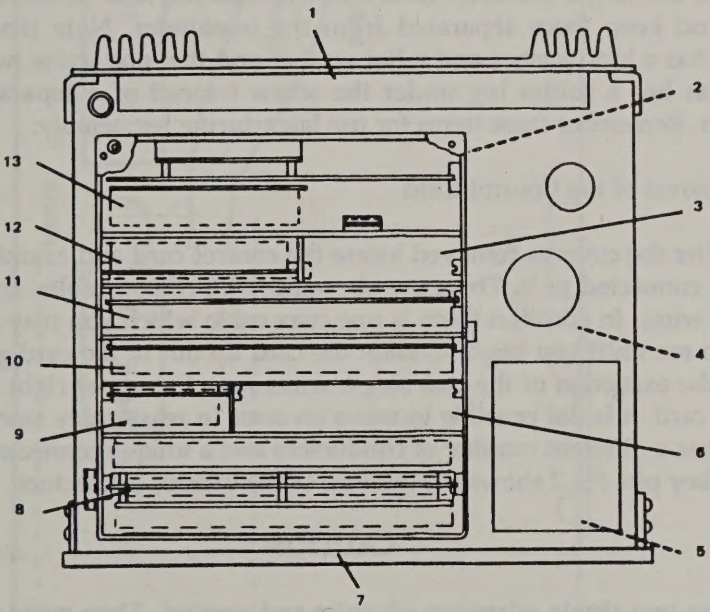
1. Disassembly in order to gain access to the control card.
2. Removal of the control card.
3. Installation of the memory adapter board.
4. Electrical performance checks.
5. Reassembly of the transceiver.

These steps are described in detail below. Up to an hour and a half should be allowed for the modification to be completed.

IV. Disassembly of the transceiver

The only tool required for this part is a Phillips screwdriver. We recommend covering a portion of the work area with a folded large towel in order to prevent scratching of either the transceiver cabinet or the work table itself.

Begin by removing the ac power cord, the keypad cable, etc. To remove the dust cover you will remove four screws located adjacent to the feet on the bottom of the transceiver. Place the transceiver upside down on the table for this step. After the screws are removed turn the transceiver right side up and if another person is available have him hold the dust cover while you pull the transceiver chassis forward out of the dust cover. If you are working alone it may help to place the radio on its right side and carefully tip it forward onto the right front edge of the front panel while at the same time sliding the dust cover off to the rear. Be careful not to damage the power switch. Also be careful



1. POWER AMPLIFIER (A1A1)
2. RECEIVER-EXCITER (A3)
3. SPEECH PROCESSOR (A12) (OPTION)
4. POWER SUPPLY CONTROL (A9A1)
5. +24 V REGULATOR (A9A2)
6. NOISE BLANKER (A11) (OPTION)
7. DISPLAY (A10A1)
8. SYNTHESIZER (A5)
9. OSCILLATOR (A7)
10. CONTROL CARD (A8)
11. PASS BAND TUNING (A4)
12. PASS BAND TUNING (A13) (OPTION)
13. LOW PASS FILTER (A2)

Figure 1: Circuit Card Locations

that the dust cover does not hang up on any of the cables along the left side of the chassis.

Put the dust cover aside and place the transceiver chassis upright on the work table with the front panel toward you. Identify the shielded enclosure and begin to remove the 34 machine screws. Note that three screws located in a row about 1 1/8 inches from the front of the box are larger diameter (and shorter) than the rest. Remove these first and keep them separated from the remainder. Note that each screw has a lock washer and a flat washer and that one screw near the left rear has a solder lug under the screw instead of a separate flat washer. Remember these items for use later during reassembly.

V. Removal of the Control Card

After the cover is removed locate the control card and examine the cables connected to it. There are six multi-wire ribbon cables and two single wires. In addition there is one coax cable which you may not be able to see until you begin to slide the card up out of the card guides. With the exception of the two single wires near the upper right corner of the card, it is not possible to make an error in reassembly since each cable has a different number of conductors and a unique connector with blank key pin. Fig 2 shows the location of the various connectors.

CAUTION

The two single wires are +5 volts and ground. They must not be mixed up during reassembly. Note that the white wire is on the left and is labeled P8 and that the legend J8 +5 is on the circuit board adjacent to the pin. This is the +5 volt wire. The black wire is on the right and is labeled P7 and the circuit board is labeled J7 GND next to the pin. This is the ground wire.

In the next steps you will gradually slide the control card upwards and remove its attached cables. As each cable is removed try to keep it out of the way by placing it in another slot or under another wire in an adjacent slot. The removal steps are as follows (Refer to Fig 2):

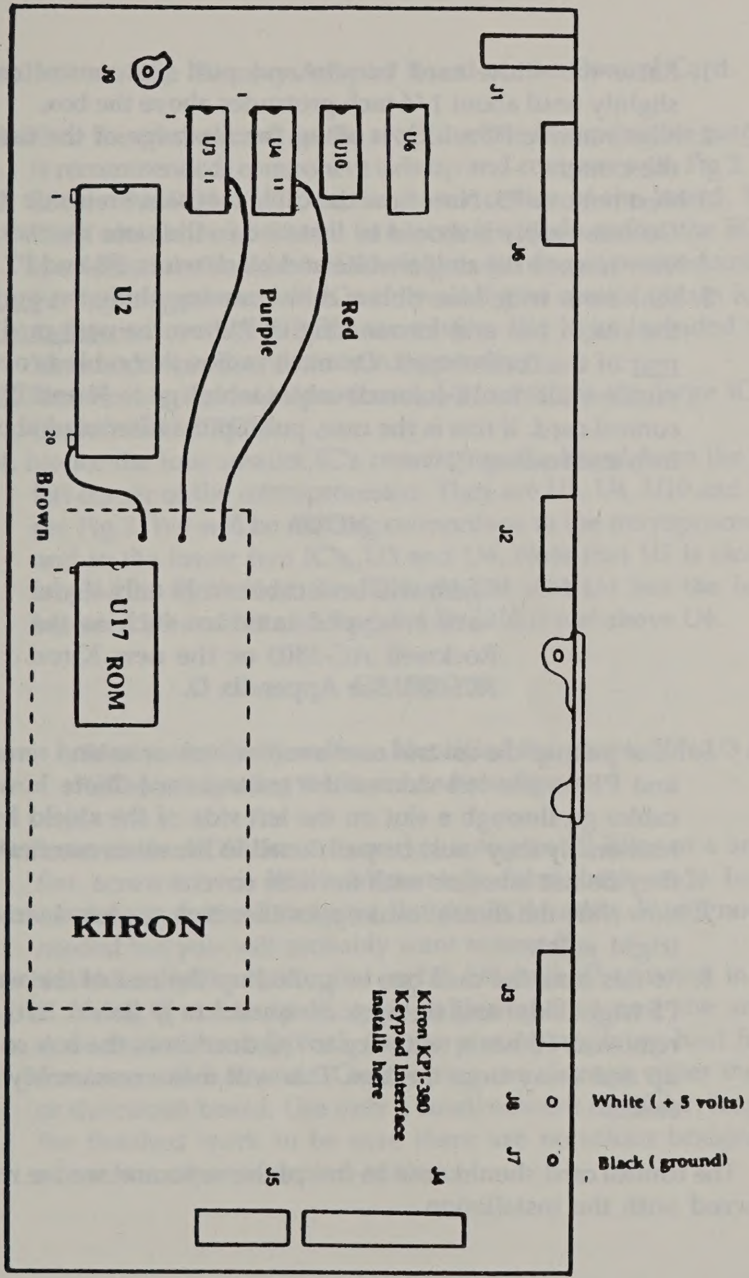


Figure 2: Control Card (A8)

1. Raise the white card handle and pull the control card up slightly until about 1/4 inch protrudes above the box.
2. Next remove P2 which is along the top edge of the card near the center.
3. Next remove P3. Note how the cable loops down inside the box. On reassembly it should be installed in the same manner.
4. Now remove the single white and black wires, P8 and P7.
5. Look for a wide blue ribbon cable running along the outside of the shield box and terminating in P11 on the next card to the rear of the control card. On most radios this cable is over two rainbow (i.e. multi-colored) cables which go to J4 and J5 on the control card. If this is the case, pull up the filter card about 1/2 inch and remove P11.

NOTE

> There will be a cable on J4 only if you have a keypad interface such as the Rockwell AC-3803 or the new Kiron KPI-380. See Appendix D.

6. Now pull up the control card another inch or so and remove P6 and P1 on the left side of the control card. Note how these cables go through a slot on the left side of the shield box. On reassembly they must be positioned in the same manner so that they do not interfere with the dust cover.
7. Now slide the control card up another inch or so and remove P4 (right side).
8. At this time the card can be pulled up the rest of the way and P5 (right side) and the coax connected to J9 (lower left) can be removed. P5 has a tendency to fall down into the box so pull it up and away from the box. This will make reassembly a little easier.

The control card should now be free of the radio and we are ready to proceed with the installation.

VI. Installation of the Memory Adapter Board on the Control Card.

1. Place the control card on the work surface (a conductive surface is recommended) component side up and compare with Fig 2.
2. Locate the ROM, U17, in the lower center of the board. The ROM should be socketed. In a very few early radios the ROM is soldered to the board. If this is the case do not proceed unless you are experienced at IC removal. If you cannot obtain local assistance contact KIRON for advice. We have included our hints and recommendations in Appendix A.
3. Next locate the microprocessor, U2, which is the large IC to the left of the ROM.
4. Notice the four smaller IC's running up the board from the top left corner of the microprocessor. They are U3, U4, U10 and U6, see Fig 2. We will be making connections to the microprocessor and to the lower two IC's, U3 and U4. Note that U3 is clearly labeled to the left of the IC itself but that U4 has the label between U3 and U4 and the label for U10 is just above U4.

CAUTION

Make sure that you have identified the proper IC's U3 and U4 by comparing the board and our figures.

5. Remove the ROM from its socket using an IC lifter or a small flat screwdriver. Work alternately from both ends being careful not to bend the pins. Put the ROM aside. It will not be needed but you will probably want to save it.
6. Next identify the three pins on U3, U4, and U2 as noted in Fig 2. Using a small-tip IC type soldering iron and the small diameter solder supplied, tin the pins by applying heat for a maximum of 5 seconds. Overheating can damage either the IC or the circuit board. Use only a small amount of solder. Inspect the finished work to be sure there are no solder bridges to adjacent components, pins, or traces.

The soldering iron should have a maximum of 25 watts and a three wire cord type with grounded tip is best. If you do not have a suitable iron an inexpensive choice is available from Radio Shack for $5.95 (#64-2051)

7. Carefully insert the Kiron Memory Adapter board into the ROM socket being careful not to bend any pins.

   Note that when properly installed the word KIRON is still visible, i.e. the board is designed so that the major components are under the board.

8. Finally solder the wires as shown in Fig 2 to the previously prepared IC pins. There are three wires coming from the Kiron board. The upper one [Red] goes to U4, pin 11; the middle one [Purple] goes to U3, pin 11; and the lower wire [Brown] goes to pin 20 of the microprocessor, U2.

The installation is now complete. As a final step you may wish to dress the wires against the board and secure them with a drop of silicone cement such as Dow Corning General Purpose Sealant which is available at any hardware store. A rubber bumper has been included which can be placed on the new ROM, the component under the word KIRON, to act as a spacer between the Kiron board and the Control Card. Whether it should be used or not depends on the height of the socket on your Control Card. The new board should fully seat in the socket.

The conductive foam and conducting bag may now be used to store the Rockwell ROM.

VII. Reinstallation of the Control Card.

The card is now ready to be returned to its slot and the cables reconnected.

1. Start by inserting the coax into J9. Be careful that the center conductor goes through the hole in the board and is not bent over.
2. Now start the card into the guides and install P5 (lower right). Make sure that the two coax cables pass in front of the Kiron board and do not get caught on the board as it is reinserted.
3. Install P4 (right side), lower the card a little and install P6 and P1 (left side). Get the cables attached to P6 and P1 dressed inside the shield box as they were before.
4. Lower the card some more and insert P3. Dress the cable in front of the board as it was before removal.
5. Lower the control card more and now install P11 on the filter board and slide the filter board down until it seats.
6. Install the single wire connectors P8 (white, on left) and P7 (black, on right). **Check this again now to be sure there is no error. See Section V above.**
7. Finally install P2 and seat the control card at the bottom of its travel.
8. Make a final check of all connectors to be sure they are firmly in place.
9. There is a slot in the top edge of the shield partition just in front of P3. In addition to the cable for P3, there should be two coax cables and a small 4 conductor ribbon cable in this slot.

If all is in order you may proceed to the electrical testing of the radio before installing the shield box top cover.

VIII. Electrical Testing

1. Attach the ac cord and the keypad.
2. Press and hold two keys on the keypad (5 and CLR) while turning on the ac power switch. [Some keypads may not have a key labeled CLR. It is the lower right hand key at the bottom of the fourth column.]

3. The radio should beep three times and indicate 15.0 MHz on the VFO A or B position. Release the keys after the three beeps.
4. Proceed to store some frequencies in a few of the memories. There are now 100 memories.

> **Note:** If you did not previously have a WARC ROM there is a change in keypad operation. The non-WARC ROM had ten memories addressed with a single key as 0 through 9. The KIRON Memory Adapter has 100 memories addressed as 00 through 99. In other words you must now press two digits when storing or recalling a frequency from memory, e.g. STO 05 or STO 89.

5. Switch to the B VFO and set it to some frequency of choice.
6. Now turn off the power. Wait a few seconds and turn the radio on again. The VFO's will have the same frequencies as before. Step through the memories and verify that they are still there.

This completes the checkout. We think you will soon wonder how you ever got along without it. You are now ready for many years of enjoyment.

Should you ever want to clear all the memories and "start afresh", just repeat the power-on procedure, i.e. press 5 and CLR while turning on the ac power. This will clear all memories and reset the A and B VFO's to 15.0 MHz.

Appendix D contains additional instructions concerning keypad installation and operation. In particular there is a difference in the operation of the RCL (Recall) key as compared to the Rockwell ROM. We recommend that you read through Appendix D.

IX. Troubleshooting

The software in the transceiver monitors a number of possible trouble spots in the radio and if a fault is detected special hardware is activated which causes a continuous beeping of the sidetone oscillator to be heard through the speaker. For example difficulty with the synthesizer will activate the beeping. Difficulty with the control card will also activate the beeping. This could occur for example if the microprocessor failed to initialize properly. There could be a number of reasons for the failure but one of them could be that the Kiron board has lost its contents. We have provided a means for overcoming this type of problem. Just turn off the power and perform the power-on reset procedure which was described at the end of the last section (5 + CLR keys held down while power is turned on). In most cases this will correct the problem although you will have to reload the memories.

We have cycled our transceiver on and off thousands of times using a computer to turn the ac power on and off at 15 second intervals. We have never experienced a loss of memory. One customer had difficulty which could not be corrected by the above procedure. It was subsequently discovered that the control card had developed another difficulty unrelated to the KIRON board.

If you should experience difficulty we ask that you try the reset procedure. Should the condition reoccur please notify us.

X. Final Reassembly

1. Check again the positions of all cables to be sure that none will be pinched when the shield cover is replaced.
2. Replace the cover and tighten all screws securely. This is an important step. If you tighten too much you will "strip" the receptacle. On the other hand if the shield cover is not firmly in place you will have birdies in the receiver. Just tighten each screw firmly according to good mechanical practice.
3. Now reinstall the dust cover. Be careful not to damage the cables along the left side as you slide the cover on.
4. Turn the transceiver upside down and replace the four bottom screws.

XI. Final Comments

This completes the installation of the KIRON Memory Adapter. We invite your comments and hope that you will tell your KWM-380/HF-380 friends about our product. Should you ever have difficulty we are at your service.

KIRON CORPORATION
1516 Essex Road
Columbus, OHIO 43221
USA

614-486-5746

Appendix A

ROM SOCKET INSTALLATION HINTS

The battery backup memory adapters from Kiron Corporation attach in place of the ROM integrated circuit at location U17 on the Control Card (A8), see Fig. 2 of the main text.

The vast majority of KWM-380/HF-380s have the ROM in a socket which of course makes for a very simple installation. However, some early radios have the ROM soldered into the PC board. If this is the case the old ROM must be removed and a socket installed before the Kiron board installation can proceed.

The information that we have suggests that Rockwell-Collins began to install the ROM in a socket with Rev J of the Control Card which corresponded to about KWM-380 serial number 520. We have no information on the HF-380. However, a great many of the early KWM-380s were retrofitted with a socket if the extended frequency (i.e. WARC ROM) option was installed by the factory service facility. For those few owners who still have a radio with a soldered-in ROM, this memo should make the process of installing a socket as painless as possible. Of course the concern is that we want to remove the old ROM without damaging the PC board traces.

We have had considerable experience with the use of sophisticated (i.e. expensive) desoldering tools and have concluded that it is a mistake even with such special equipment to try to remove the old ROM intact. Invariably one pin sticks and while applying lifting pressure, a pc trace is damaged. There are times of course when it is imperative that the old part be saved. But in this case the old ROM is of no use and therefore the best procedure is to sacrifice the old ROM.

Begin by cutting the pins from the old ROM with a pair of pointed cutters. We use a pair of Xcelite 96CG snips, see Fig. A1. These are available at electronic parts houses for about $7.00 to $10.00. A less expensive alternative is available from Radio Shack. They call them Nippy Cutters (#64-1833) and the cost is $2.99. The important thing is to clip off each IC pin at the IC, not at the level of the PC board. When all of the pins have been cut the plastic body of the IC will drop away.

You are now left with 24 pieces of metal, each one soldered into a hole. Now apply heat with a small soldering iron to a pin and when the solder is melted, grasp the pin with a pair of tweezers or pliers and remove it. This process goes very smoothly. You are then left with some or all of the holes filled with solder. Now go back over the holes one by one with the soldering iron and a spring-loaded vacuum desoldering tool such as the Radio Shack #64-2120 ($6.95) and clear out the solder. Sometimes we use the tool above the board alongside the soldering iron as suggested in the instructions and sometimes we place the tool below the board and the iron above the board and pull the solder through the hole although in this latter procedure it is sometimes difficult to get the desoldering tool tip centered properly below the hole. If you have trouble clearing out a hole it may be because it is partially open already. In this case we have found it helpful to first apply solder to fill the hole. Then try again with the tool. The fresh solder is now usually removed very easily. Sometimes we also use a simple soldering bulb (Radio Shack #642086, $1.99) instead of the #64-2120 tool.

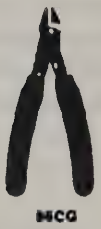


Fig A1

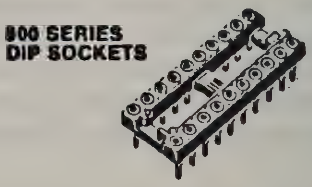


Fig A2

After the holes are cleaned up, make a visual inspection of the board to make sure that no solder remains between traces. When you are satisfied insert the socket and solder it. Be sure to install the socket with pin 1 to the left as viewed from the top of the board, see Fig. 1 of the main text.

Finally we would like to make a recommendation concerning the IC socket itself. We recommend a higher quality socket than Rockwell-Collins used. Fig. A2 shows a low-profile "machined pin" type IC socket. The one shown is an Augat type 824-AG11D which costs about $3.50 from Newark Electronics or other parts houses handling Augat products. The machined pin design is recognizable by the round pins and round socket holes as can be seen in the figure. This design provides a superior gripping action and long life, thus securely holding the IC or the Kiron Memory Board. For those who want to go deluxe the Augat 824-AG10D gold plated socket is available. [The Kiron plug is gold-plated]. This type costs about a dollar more.

We want to emphasize that the process is not at all difficult so long as you first cut off the IC pins and do it as high as possible off the pc board so that you have an adequate length of pin to grasp with the tweezers.

We hope that the above information is helpful and are always interested in your experiences with our suggestions so that we might improve the information we give future customers.

Appendix B

ROMS AND TRANSMIT FREQUENCY BANDS FOR 380 SERIES TRANSCEIVERS

There are three different ROMs which may be found in socket U17 of the control card. The part number is marked on the ROM. Part R1453-11 is the original KWM-380 ROM. It restricts transmit to the amateur bands in existence before the WARC frequency allocation convention. Most KWM-380s will have ROM R1453-12. This is so-called WARC ROM which permits transmission on the new amateur bands created by the WARC convention and also provides transmissioin capability on some frequencies above and below certain amateur bands which are allocated to the Military Amateur Radio Service (MARS). The HF-380 ROM is R1451-12 and of course it permits transmission on all frequencies from 1.8 to 29.99 MHz. There are a number of transceivers which have a KWM-380 front panel nameplate but they have been upgraded to HF-380s by the addition of a second low pass filter board in the transmitter. These radios would also have the R1451-12 ROM. However we have encountered some KWM-380 radios which have the R1451-12 ROM but have not otherwise been changed. This is not a recommended situation and severe difficulties can occur. We suggest that if you suspect that the radio you own has been modified that you read the following information carefully and check your radio before installing a KIRON memory adapter board so that you may verify that you have ordered the correct memory adapter model.

Kiron Corporation offers three models (M1-A, M2-A, M3-A) of our memory adapters for the ROCKWELL 380 Series transceivers. The three models differ only in the computer program contained in the on-board ROM, as is explained below. The M1 is identified by a green dot on the ROM; the M2 by a yellow dot; and the M3 by a red dot.

On transmit both the KWM-380 and the HF-380 transceivers direct the power amplifier output through a low pass filter and directional coupler assembly and then to the antenna. The filters are switched in or out of the circuit by means of relays. At each frequency the microprocessor on the Control Card (A8) selects the proper filter relays in accordance with a table stored in the ROM and also provides necessary time delays in order to prevent "hot switching" of the relays.

The low pass filter-directional coupler assembly is located at the rear of the card cage. A brass plate goes across the full width of the cage. The KWM-380 contains one filter board (A2A1) with five filters designated LP1, LP3, LP6, LP8, and LP9. It is located on the left side and is mounted on the front of the brass plate. The HF-380 contains a second filter board (A2A3) with additional filters designated LP2, LP4, LP5, and LP7. If present this board is to the right of the A2A1 filter. The assembly under discussion also includes a directional coupler board (A2A3) which is located on the left side and to the rear of the A2A1 low pass filter board.The purpose of the filters, of course, is to reduce harmonic and spurious emissions. Figure 1 shows the cutoff frequencies of the nine filters.

There is another difference between a KWM-380 and an HF-380. When a KWM-380 is converted to an HF-380, in addition to the installation of the A2A3 filter board it is necessary to remove four diodes (CR3, CR6, CR7 and CR9) from the Control Card (A8). The filter which is selected is a combination of software (the program in the microprocessor ROM) and hardware (a wired-OR circuit using the above mentioned diodes). For example if a transmit frequency between 2 and 3 MHz is selected and the diodes are not removed, both LP2 and LP3 will be selected with undesirable consequences. However, if the A2A3 filter board is not present the diodes guarantee that the next higher filter will be selected, in this case LP3.

We will now describe the three memory boards produced by Kiron Corporation. The information to be discussed is summarized in Table B1. The normal WARC ROM equipped KWM-380 operates as shown in the top portion of the table. Note that although the nominal cutoff frequency of LP3 is 4.0 MHz, this filter is kept in-line through 4.25 MHz in order to provide harmonic suppression during 4.00 to 4.25 MHz MARS operation. This is possible due to the slow roll-off of the filter. In a similar manner LP6 is kept in-line to 10.15 MHz in order to accomodate the new 30 meter amateur band and LP8 is not switched in until frequencies greater than 10.15 MHz are selected.

The lower part of Table B1 shows the filter selection for the HF-380 or for a KWM-380 which has been modified by the addition of the A2A3 filter board and removal of the above mentioned diodes. There are now nine filters and the frequencies at which the filters are switched in or out are different. For example when operating on a MARS frequency just above 4.00 MHz, the HF-380 model selects LP4 instead of retaining LP3 beyond its normal cutoff frequency. The Kiron Model M2 operates in an identical fashion to the HF-380. **It would not be advisable to install the HF-380 ROM (R1451-12) without installing the A2A3 board and removing the diodes.**

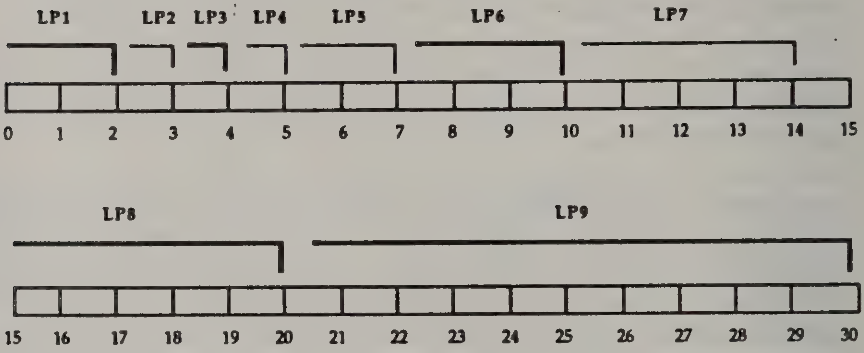


Figure B1: Low Pass Filters of the KWM-380/HF-380.
The KWM-380 has only filters LP1, LP3, LP6, LP8, and LP9

The entries in the middle part of Table B1 are for the Kiron Model M3 which is intended for installation in a KWM-380 which has only the normal A2A1 filter board installed and with the diodes on the Control Card still in place. However, the Kiron M3 permits transmitting on all frequencies from 1.8 to 29.99 MHz. A careful examination of Figure B1 and Table B1 will reveal the operation. Note that we have retained the filter selection frequencies from the normal KWM-380, see upper part of Table B1, so, for example, transmission at 4.10 MHz would still use LP3. However for any frequency between 4.25 and 6.75 MHz the M-3 will select LP6 which has a cutoff of 10 MHz. Thus for the range 4.25 to 5.00 MHz there will be no second harmonic suppression since the harmonic is below 10 MHz. For transmission between 10.15 and 20 MHz filter LP8 is selected. Note that for frequencies above 14 MHz the same filters LP8 or LP9 are selected by all models including the HF-380, in other words the extra HF-380 filters are all below this frequency as can be seen from Figure B1.

As long as the operator is aware of the above information and is licensed to transmit on frequencies outside the USA amateur bands or transmits only into a dummy load for laboratory testing, the M3 board should fill a need. **Note that one should not remove the diodes when a Kiron M3 board is used.**

Kiron Corporation assumes no responsibility for problems caused by the increased harmonic or spurious emissions when transmitting in the frequency bands listed in Table 4. The A2A3 filter board is available from Rockwell Inc. (current price about $640.) and is recommended if transmission outside the amateur bands is anticipated. The additional filters may provide a benefit on receive as well as on transmit.

If transmission is anticipated on only one frequency outside the amateur bands and if harmonic radiation is the major concern, a cost effective solution might be to construct a special low pass filter and install it between the transceiver output and the antenna for the band in question. General filter design information can be found in the ARRL Handbook and other engineering handbooks. Also a number of personal computer programs are now available which simplify the design of filters.

Frequency Coverages of KWM-380/HF-380 Memory Boards from Kiron Corporation				
	Filter	**Frequency**	**Transmit Bands**	**Amateur Bands**
		(MHz)	**(MHz)**	
KWM-380/WARC ROM	LP1	0 - 2	1.8 - 2.0	160
(also Kiron Model M-1)	LP3	2 - 4.25	3.25 - 4.25	80
(Green Dot)	LP6	4.25 - 10.15	6.75 - 7.55	40
			10.10 - 10.15	30
	LP8	10.15 - 20.0	13.75 - 14.60	20
			18.060 - 18.170	17
	LP9	20.0 - 29.99	20.75 - 21.70	15
			24.890 - 24.990	12
			28.0 - 29.7	10
Kiron Model M-3	LP1	0 - 2	1.8 - 2.0	160
(Red Dot)	LP3	2 - 4.25	2.0 - 4.25	80
	LP6	4.25 - 10.15	4.25 - 10.15	40
	LP8	10.15 - 20.0	10.15 - 20.0	30, 20, 17
	LP9	20.0 - 29.99	20.0 - 29.99	15, 12, 10
HF-380	LP1	0 - 2	1.8 - 2.0	160
(also Kiron Model M-2)	LP2	2 - 3	2 - 3	
(Yellow Dot)	LP3	3 - 4	3 - 4	80
	LP4	4 - 5	4 - 5	
	LP5	5 - 7	5 - 7	
	LP6	7 - 10	7 - 10	40
	LP7	10 - 14	10 - 14	30
	LP8	14 - 20	14 - 20	20, 17
	LP9	20 - 29.99	20 - 29.99	15, 12, 10

Table B1: Filter Select Frequencies

Appendix C

Battery Lifetime Estimates

The Kiron Memory Adapters use a CMOS static RAM IC with two internal lithium batteries. The IC also contains the circuitry which automatically switches to the battery back-up mode when the mains power is turned off. Several vendors currently market such devices. Our product uses the MK48Z02 ZEROPOWER™ RAM made by Thomson Components - Mostek Corporation. We believe that it is the highest quality part available.

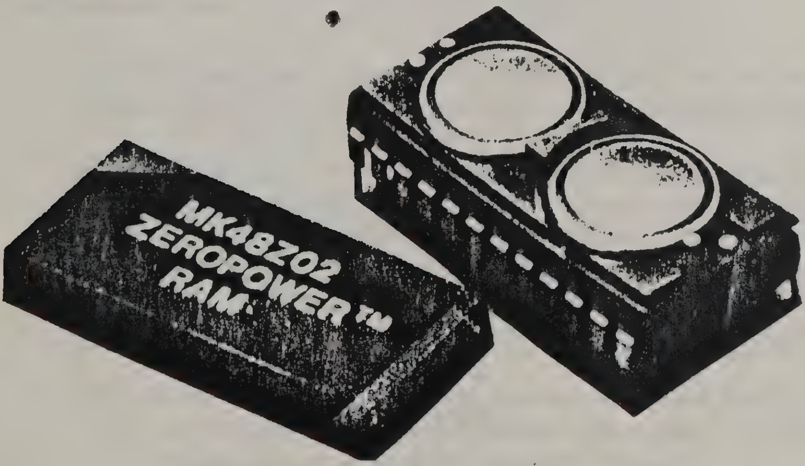
Lithium batteries of the type used in the Kiron Memory Adapters were developed in 1971 by Panasonic Corporation. You may be aware of the recent appearance of cameras with built-in flash and motorized film advance which will operate for five years on one battery. Not all "lithium" batteries are alike, however. The type used in our product uses a solid cathode and is referred to as lithium carbon mono-fluoride type. It has advantages of safety as well as extremely long shelf life. The following discussion is excerpted from the Thomson-Mostek data sheets.

Figure C1 illustrates the dependence of battery life on temperature. The life of the battery is controlled by temperature and is virtually independent of the percentage of time the IC spends in the back-up mode. The two curves in the figure are labeled ($t_{50\%}$) and ($t_{1\%}$). The curves represent accumulated life test data from over 100 million hours of continuous testing by Mostek. Extrapolating the data in Figure C1 shows, for example, that given a particular sample number of devices kept at 25 C (77 F), 1% of the devices may fail after 700 years and 50% are predicted to fail after 1100 years. Battery life is determined from date of manufacture. Each IC is marked with a date code in the form YYWW (Example: 8502 = 1985, week 2). The date code is near the Mostek logo in the center of the IC. The more prominent number in the lower left corner is a battery lot code. Our experience with conventional equipment which can be powered either from ac mains or battery would indicate that the batteries would last longer if the equipment was powered primarily from the mains. There are 8760 hours in a year. So for example if the KWM-380 was "used" 10% of the time the memory would be backed up by the battery for 7884 hours per year. But our intuition misleads us for as stated above the battery life depends on temperature and our tests show that the KWM-380 internal temperature in the compartment which houses the memory adapter and battery is 17.5 °C higher than the ambient room temperature so that the battery which is intended for backup is actually being depleted more rapidly during the time that the radio is ON! This would be a distressing situation were it not for the extremely long battery lifetimes predicted by Figure C1. If a particular memory IC spends part of its life at one temperature and part at another, a mathematical equation is available to estimate the lifetime. Using this formula we have prepared the table shown on page 25. It has been assumed that the transceiver is ON (i.e. mains powered) 10%, 50% and 90% of the hours in a year. One set of numbers shows when 1% of the batteries will fail and the other set shows when 50% will fail. The results show that under severe conditions where the radio is kept in a room which is constantly at 40 °C (104 °F) throughout the year, and is turned on 90% of those hours, only 1% of the batteries will fail after 39 years. The failures will then begin to increase until 50% will have failed after 65 years. This could be correctly referred to as the average expected life. Under less stringent conditions the lifetime can exceed 100 years. In order to be extremely conservative we advertise a lifetime of 40 years.

Thomson-Mostek further states that the summary information presented in the Figure C1 represents a conservative analysis of the data presently available. Thomson-Mostek probably has the largest collection of battery life data available anywhere in the world. As more data becomes available, they believe that future read-points of tests now underway will result in longer life estimates than those presently given. However this seems a bit academic when the current predictions already exceed the lifetime of most of us!

We have been asked why we did not use a replaceable battery in a holder. The MK-48Z02 provides a low cost, simple design and in our view has a higher reliability (MTBF). The MK48Z02 memory IC is really a complex system which has been carefully engineered for reliability and long life. The memory current drain is as much as three hundred times less than conventional CMOS RAM ICs which are often used in battery backup applications. The MK48Z02 uses two lithium batteries and the analog cutover circuitry contained in the IC automatically selects the battery with the highest voltage. This redundancy is just one example of the careful design we refer to. The MK48Z02 also incorporates analog circuitry to detect low mains power supply voltage. Whenever the voltage drops below 4.5 volts this circuitry protects the memory from accidental write cycles. **Most importantly the power fail detector is powered by the battery itself and not by the external 5 volt supply as is the case in many less carefully engineered systems.** This helps to prevent bad write cycles from the microprocessor. To the user this means that the Kiron board is less likely to lose data as compared to other designs. The batteries are sealed or encapsulated in the "top hat" of the IC. Sealing of the battery in the plastic case of the IC improves battery lifetime by preventing evaporation of the battery electrolyte. An external battery system would not have this advantage. In addition a sealed battery cannot leak electrolyte into the radio. For all of these reasons we feel that the Kiron design is the finest that could be implemented. The quality of the KWM-380/HF-380 deserves the best quality in add-on products.

There will undoubtedly be some failures of the memory IC due to manufacturing defects, lightning strikes of the transceiver or perhaps premature battery failure. In this case the old chip is desoldered from the board and a new one installed using normal IC replacement procedures. A socket could have been used but the result would have been increased cost with no benefit - in fact one could almost guarantee that eventually socket contact problems would appear.



External Temp	% ON, 1% Failure			% ON, 50% Failure		
°C	10	50	90	10	50	90
20	802	381	250	1357	633	413
25	500	293	152	857	400	261
30	321	150	98	547	257	168
35	202	94	61	342	159	103
40	129	60	39	214	100	65

Table C1: Battery Life in Years vs Percent Transceiver Usage and Room Temperature.

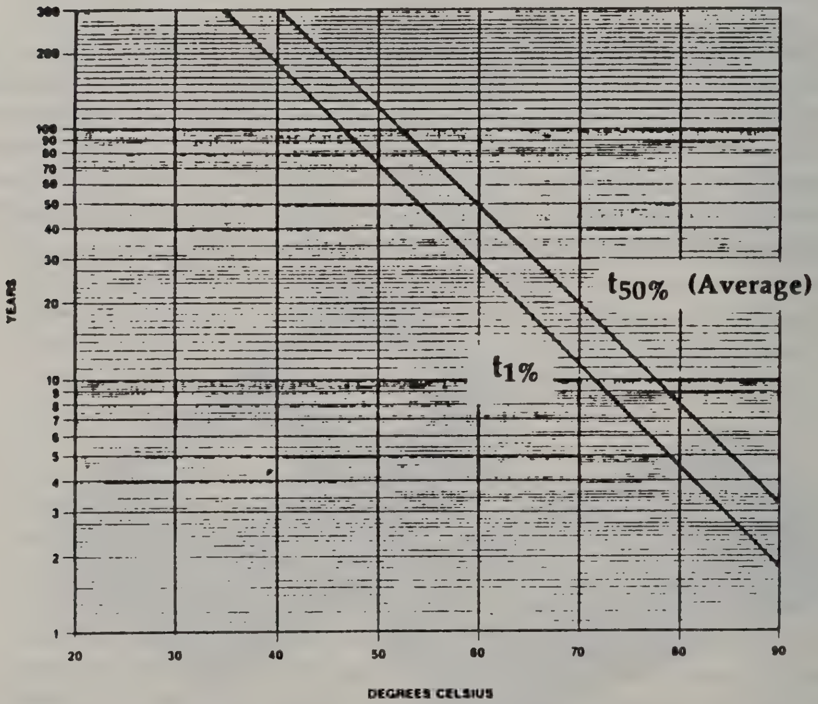


Figure C1: Battery Lifetime vs Temperature

Appendix D

ADDING A KEYPAD TO A 380 SERIES TRANSCEIVER

1. Description

The Kiron KPI-380 keypad interface kit interconnects the KWM-380 or HF-380 transceiver to an external keypad. From the keypad the operator can set the operating frequency of the transceiver or store and recall frequencies from memory. If used with a transceiver equipped with a Kiron Memory Adapter, up to 100 frequencies can be stored. The KPI-380 can also be used to interface the transceiver to an external computer, see Appendix E.

2. Installation

Installation of the KPI-380 consists only of mounting the circuit card via its DB-25 connector to the already existing cutout on the rear panel of the transceiver and plugging the ribbon cable to connector J4 on the transceiver Control Card. See Fig 2 of the main text for the location of J4.

To prepare for the installation the dust cover and the card cage cover must be removed. The procedures are described in Section IV of the main text.

a. Next remove and discard the blank cover plate on the rear panel of the transceiver to expose the connector hole.

b. The ribbon cable must be routed from the bottom rear of the transceiver and then along the right side of the card cage (as viewed from the top) to the Control Card. There is a "slot" between the heat sink and the main chassis which will allow the cable to be routed from bottom to top. However the slot is too narrow to permit the connector to pass through the slot.

To widen the slot temporarily remove or loosen the six heat sink mounting screws. The screws are located along the left and right edges of the heat sink. After the cable is routed through the slot, replace the heat sink screws and tighten.

c. Now mount the KPI-380 board to the rear panel connector hole. Remove the hex stud hardware from the KPI-380 and reattach from outside the chassis. Tighten securely. The board mounts so that the ribbon cable goes from the top of the circuit board directly through the heat sink-chassis slot to the top side of the chassis. There are a couple of coax cables which may interfere with the ribbon cable. Just rout the cable in any convenient manner. There is plenty of excess length.

d. Now solder the ground wire to the solder lug on the nearby audio out phono jack. This completes the under chassis portion of the installation.

e. It is now necessary to partially remove the Control Card in order to attach the KPI-380 cable to connector J4 on the Control Card. The procedures are described in Section V of the main text. When the card is high enough, attach the ribbon cable to J4. Note that the KPI-380 connector does not have a blank key position so it could conceivably be installed upside down. We have marked the top of the connector with an etched letter "T". When properly installed the cable exits directly out the side slot in the card cage box. If installed incorrectly the cable would have to fold back over the connector itself before exiting the box. This is incorrect.

f. This completes the installation. Follow the procedures in Section VII of the main text on reinstallation of the Control Card. There is excess length on the KPI-380 cable. The excess should be folded and placed near the right rear corner of the card box, between the box and the filter capacitor.

g. Note that the blue cable labeled P11 which goes to the Band Pass Filter card (A4) should go in last. The KPI-380 ribbon cable will be under the band pass filter cable when the Control Card is fully inserted.

3. The Pipo Communications Keypad.

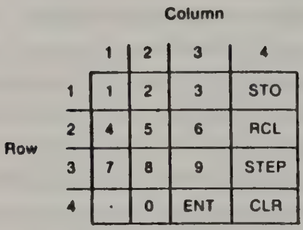
The required key pad is available from Pipo Communications, Box 2020, Pollock Pines, CA 95726, Phone 916-644-5444. They advertise frequently in QST and HR. The price is $25.00 including shipping. Request the "Collins KWM-380 Keyboard." They do not seem to have any other model number designation for this part.

The keypad as you receive it will require the addition of a cable and a back plate or base. We fabricated a back from a piece of blank circuit card material. We used recessed flat head machine screws and felt bumper material to prevent scratching the desktop. Some people have made a metal base which does have the advantage of adding weight. The cable requires 9 wires. We used a 42 inch piece of flat ribbon cable similar to that on the KPI-380 card. It has the advantage of being more flexible that some round cables with nine or more conductors but this is simply a matter of preference. You will also have to fabricate an exit hole for the cable. In the case of the flat ribbon cable we filed a slot at the top between the actual keypad and the separate piece (included) which is called the frame. The keypad pins are located near the bottom but you will want the cable to exit at the top. The pins on the keypad are closely spaced so you will want to insulate each one with heat shrink tubing or spaghetti secured with glue. Note that the frame and the keypad are attached by press fit pins and can be easily separated. Gluing them together is not necessary and is not recommended.

Electrically the keypad is referred to as having 2 of 8 coding. This means that when a key is pressed both the appropriate row and column pin are connected to +5 volts. Note that in the keypad literature and on the keypad itself pin 9 is referred to as COMMON and that the coding is "two keys connected to COMMON". In our application common is +5 volts, not ground. Pin 10 of the KPI-380 is chassis ground, however no connection from pin 10 to the keypad is required.

The key layout is shown in Figure D1. The cable pin connections are as follows:

Keypad Pin	Function	KPI-380 DB-25 Pin
1	Row 1	1
2	Row 2	2
3	Row 3	3
4	Row 4	4
5	Column 1	5
6	Column 2	6
7	Column 3	7
8	Column 4	8
9	+ 5 volts	9
NC	Ground	10



	1	2	3	4
1	1	2	3	STO
2	4	5	6	RCL
3	7	8	9	STEP
4	.	0	ENT	CLR

Figure D1

The Rockwell AC-3803 Control Interface Kit included a number of outputs from the microprocessor which were intended for the control of an external linear amplifier. Since noone to our knowledge has ever used these signals we deleted them from the KPI-380. This has enabled us to have a cleaner circuit card layout and has been mainly responsible for the lower cost of our unit.

4. Key Pad Operation

a. VFO A/B Frequency Entry.

The operating frequency of the radio can be entered from the keypad. As the digits are entered they will appear on the transceiver display but the current operating frequency will not be changed until the ENTER key is pressed.

The MHz portion of the frequency must be separated from the kHz portion by a decimal point. No decimal point is required between the kHz and Hz portions.

The KWM-380 software is written such that trailing zeroes need not be keyed in. We have found the lack of this feature to be a particular annoyance with some radios we have used. Thus with the KWM-380 to set the frequency to 14.2 MHz, key in 1 4 point 2 ENT. Frequencies can be entered, however, all the way down to the 10 Hz position.

To enter into the other VFO the A/B switch must be changed from the front panel and another frequency entered. If a mistake is made before ENT is pressed just press CLR and start over. To enter frequencies below 1.0 MHz you must enter a leading zero and the decimal point. Thus for a broadcast station at 680 kHz, enter 0 point 6 8 ENT.

b. Memory Storage.

To store the current operating frequency into memory press STO followed by a two digit number between 00 and 99. Memories (also referred to as presets) below ten require a leading zero (e.g. 07).

Frequencies can be stored in memory without changing the current operating frequency, that is you can continue listening to a net while loading memories. Just key in the frequency followed by STO and the two digit preset number. The display will automatically return to the operating frequency at the end of the STO operation.

c. Frequency Recall.

To load a frequency from memory into the active VFO just press RCL followed by the two digit preset number.

In the original Rockwell software if one entered RCL and a memory location that had a zero frequency installed the command would be carried out and the VFO would be set to 0.000.00. Try this. Manually set the VFO to .000.00 with the tuning knob. The S-meter reads the strength of an internal oscillator. When we implemented 100 memories, many of which might not be in use, the Rockwell scheme quickly became an annoyance. Our Kiron Memory Adapters are programmed to simply ignore a RCL from a storage location if that location contains a zero frequency.

d. Frequency Stepping.

The memories can be stepped through in sequence by repeated presses of the step (STP) key. Only those memories which have non-zero frequencies stored will be included in the sequence. For example if you have only stored in memory locations 06, 13, and 82, the STP key will cause only the three frequencies stored in these locations to be accessed.

e. Clearing Memory Locations.

To clear all 100 memories turn off the transceiver power. Then press the 5 and the CLR keys with two fingers and while holding the two keys down, turn on the transceiver power. Wait until the beeping stops (three or four beeps). Then release the keys. At this point all memories are cleared to zero and VFOs A and B are set to 15.0 MHz. An individual memory location can be cleared by entering 0.0 STO followed by the two digit preset number. This can be done while listening to another frequency. If you want to clear several locations set the VFO manually to .000.00 with the tuning knob. Then press STO followed by the number for each location to be cleared.

Appendix E

Hints on the Connection of the KWM-380 to a Computer

Numerous transceivers now on the market were designed for control from a computer. For example the Kenwood 940 has 25 functions which can be set or read from a computer. This includes changing the frequency of one of the VFOs or reading the current VFO frequency.

Although the KWM-380 was designed several years earlier it is possible to implement a limited control by connecting the computer in place of the keypad. If the computer has a parallel port such as a printer port it is only necessary to make a special cable. No other hardware is required.

Remember that the keypad is an input device only. Therefore we will be limited to sending commands from the computer to the KWM-380. There can be no transfer of information in the other direction. The computer program will simply reproduce in sequence and more quickly what you can do manually from the keypad. Thus we can store frequencies in memory or recall from memory to the active VFO (that is the one currently selected by the manual front panel A/B switch). In addition the STP command can be used to cycle through memories.

The simplest program - and we always recommend starting with a simple idea - might ask you to enter a frequency. Then it would request you to state a destination (that is memory 26 for example). Then a carriage return would carry out the operation. Verification would consist of issuing a RCL 26 from the computer and observing the LED display. Another program could be written which would read from a disc file and load all 100 memories. A word processor could be used to create and edit the memory data file. The purpose of this note is just to give suggestions. We may at some future time supply a program but we do not have one ready at this time.

As far as hardware is concerned the computer must have a parallel port such as a printer port. The available computer language must allow sending an 8 bit character to the port. For an IBM PC or clone with a parallel printer port we can specify the required interconnect cable. The IBM uses a DB-25 connector for the printer port. So we need a cable with

DB-25 connectors on both ends and with the following connections. Unfortunately the cable needs to have a male DB-25 on both ends so it will be necessary to clearly label the cable ends when it is completed.

IBM Pin	Computer Function	Keypad Pin	Keypad Function
2	D0	1	Row 1
3	D1	2	Row 2
4	D2	3	Row 3
5	D3	4	Row 4
6	D4	5	Column 1
7	D5	6	Column 2
8	D6	7	Column 3
9	D7	8	Column 4
18 - 25	Gnd	10	Gnd

When the program wishes to simulate the pressing of a keypad key, it must set two of the bits high, that is to a 1. So for each key we have a code or number to be sent from the computer to the printer port. They are as follows.

Key	D7 - D0	Hex	Decimal	Character
1	0001 0001	11	17	Ctrl-Q
2	0010 0001	21	33	!
3	0100 0001	41	65	A
4	0001 0010	12	18	Ctrl-R
5	0010 0010	22	34	" (quote)
6	0100 0010	42	66	B
7	0001 0100	14	20	Ctrl-T
8	0010 0100	24	36	$
9	0100 0100	44	68	D
0	0010 1000	28	40	(
point	0001 1000	18	24	Ctrl-X
ENT	0100 1000	48	72	H
STO	1000 0001	81	129	Note
RCL	1000 0010	82	130	Note
STP	1000 0100	84	132	Note
CLR	1000 1000	88	136	Note

Note: Different computers handle the so-called graphics characters differently. These are the last four characters in the above table and are the ones with the high bit set. Refer to your computer manual.

The final piece of information that we need to know is that the KWM-380 requires that the key be pressed for approximately 10 milliseconds. Also the key must be released for 10 milliseconds before the next key is pressed. Your software must simulate the same sequence of key presses that you would press manually and be corrected timed. The steps are as follows:

1. Write the value of the key to the port.
2. Wait for at least 10 milliseconds.
3. Write zero to the port.
4. Wait for at least 10 milliseconds.
5. Repeat steps 1 - 4 for each key.

How can you obtain a 10 millisecond delay? It is usually easy to write a loop that does not do anything, just to waste time. In assembly language the time can be easily calculated; however, in BASIC it may be difficult to know exactly how long a loop will take to complete. Fortunately trial and error is usually satisfactory. If the KWM-380 fails to receive the proper frequency increase the loop counter. If it takes too long to send a frequency, try reducing the loop count until errors occur.

As they say happy programming. If you develop a program which you would like to share let us know and we will send a copy to all customers.

14.235.86
Pro-mark
METER
ALC
MIC / CARRIER
MODE
LSB
USB
CW
AM
VFO
SELECTIVITY
GAIN
AF
RF
MIC
PHONES
SPOT
POWER

ROCKWELL-COLLINS

KWM-380

Owner's Manual

Pro-mark™

The Mark of the Professional

523-0769877-001217
1 October 1979

owner's manual

Collins KWM-380 Transceiver

Collins Telecommunications
Products Division
Electronic Systems Group
Rockwell International
Cedar Rapids, Iowa 52406

Printed in the United States of America

introduction

This manual contains operating and installation information for the fully synthesized, all solid-state KWM-380 Transceiver. Full coverage from 29.999 99 down to 0.500 00 MHz is standard in the receiver circuits. Transmission is limited to 1.800 to 2.000, 3.500 to 4.000, 7.000 to 7.300, 14.000 to 14.350, 21.000 to 21.450, and 28.000 to 29.700 MHz in the Amateur Radio Service bands. The pll synthesizer tunes in 10-Hz increments either manually or with an optional remote keypad control. Split vfo is standard, as is the digital frequency display driven directly by the microprocessor.

Because of the uniqueness of each individual station, the installation information found here is limited in scope. In-depth information can be found in numerous publications commonly referred to by amateur radio operators.

Test procedures in this manual require only simple test equipment to perform. The procedures are a guide in tracing malfunctions to a functionally related group of circuit cards. Detailed tests requiring laboratory-type test equipment and schematic diagrams are included in the KWM-380 Transceiver Service Manual, Collins publication number 523-0769878.

specifications

Physical

Size	394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep
Weight	21.8 kg (48 lbs) max

Primary power	Strappable for: 105, 115, 125/ 210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit

Receiver

Frequency	0.5 to 30.0 MHz, tunable in 10-Hz steps
Modes	USB, LSB, AM, and CW
Sensitivity	0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)
Selectivity (3-dB bandwidth)	Selectable 8 kHz *6 kHz 2.1 kHz *1.7 kHz *400 Hz *200 Hz
If and image rejection	Greater than 60 dB

---

*Optional filters

Intermodulation distortion	-50 dB or better for two signals of -10 dB mW each, 20 kHz apart
AGC	Audio output variation not more than 8 dB for 2-μV to 100-mV open circuit rf input variation
Audio output	Not less than 3.5 W into 4-ohm load, at 1 kHz, at not more than 10% total harmonic distortion Line audio output: -10 dB mW nominal into 600 ohms Frequency response: 300 to 2400 Hz with not more than 5 dB variation
Transmitter	
Frequency	160- through 10-m amateur bands, tunable in 10-Hz steps

160 m	1.800	-	2.000	MHz
80/75 m	3.500	-	4.000	MHz
40 m	7.000	-	7.300	MHz
20 m	14.000	-	14.350	MHz
15 m	21.000	-	21.450	MHz
10 m	28.000	-	29.700	MHz

Modes	USB, LSB, and CW
Output power	100 W pep, nominal In CW or RTTY, automatic turn-down to 50 W after 10 seconds, 50 percent duty cycle, key down 15 minutes, max. With optional blower kit installed, power is 100 W average, 50 percent duty cycle, key down 1 hour, max, at 25 °C; 30 minutes, max, at 50 °C for all modes.

Unwanted signal suppression	
Carrier	-50 dB or better
Undesired sideband, 1-kHz ref	-55 dB or better
Harmonics (all)	-40 dB or better
Mixer products	-55 dB or better
Third order distortion	25 dB below each tone of two-tone test
Synthesizer accuracy and stability	Accuracy within ±5 kHz after 10 minutes warm-up when 39.6- and 455-MHz oscillators are set to within ±3 Hz Stability within ±150 Hz over temperature range of 0 to 50 °C
Rf load	50 ohms, nonreactive. Full power output with vswr of 2:1 or less. Automatic power output turndown with vswr greater than 2:1.
Audio inputs	
Microphone	Low impedance, dynamic; internal strapping for high impedance
Line	600 ohm, unbalanced; 40-mV input sufficient for full rf power output

INSTALLATION

unpacking

The KWM-380 is shipped in two separate cartons. One contains the power transformer, the other contains the transceiver. After carefully unpacking the cartons, check to be sure no shipping damage is evident. Should any damage be apparent, save the cartons and notify the delivery carrier immediately to file claim for damage.

power transformer installation

To eliminate the possibility of the power transformer breaking loose from the chassis and causing further damage during shipment, it is packaged separately. The transformer is quickly installed in five steps with just a 3/8-in open-end wrench, no 12 (3/8-in) nutdriver, and a Phillips screwdriver.

- Using the screwdriver, remove four screws from the bottom of the transceiver (near the rubber feet at each corner) and slide the dust cover off over the heat sink.

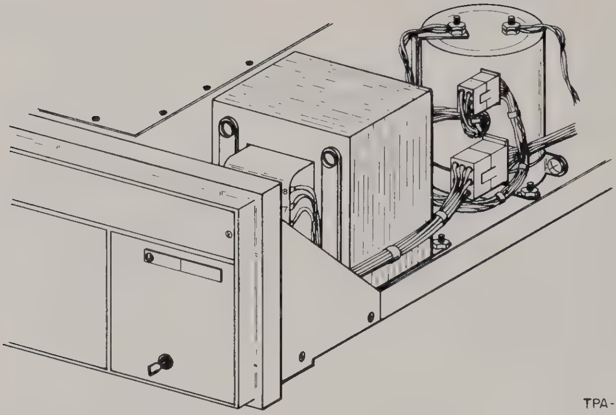
- Remove the front one of the two Phillips-head screws securing the front panel braces to the sides of the chassis and tilt the panel forward.

- Turn the transformer so terminals 1 through 8 face the front panel. With the nutdriver, remove the four nuts and lockwashers from the chassis mounting studs in the right front corner of the chassis and set the transformer over the studs.

- Using the wrench and nutdriver, secure the transformer to the studs with the four lockwashers and nuts.

- Electrically connect the transformer to the transceiver with the two attached polarized connectors. Reattach the front panel, then replace the dust cover.

Figure 1 shows the transformer properly mounted.



TPA-1655-011

Power Transformer Installation
Figure 1

primary power requirements

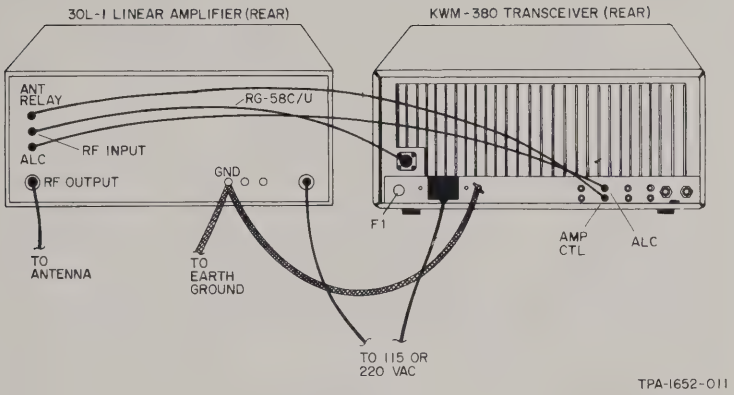
WARNING DO NOT ATTEMPT TO CHANGE VOLTAGE STRAPPING WHILE PRIMARY POWER IS APPLIED. ELECTRICAL SHOCK WILL OCCUR. DISCONNECT THE PRIMARY POWER CABLE FROM THE POWER SOURCE OR THE UNIT FIRST.

ac voltage operation

The KWM-380 will operate from various 50- to 60-Hz voltages, depending on the following internal strapping connections.

For input voltages listed, strap TB1 as follows:

WIRE	105	115	125	210	220	230	240	250
BLACK	7	7	7	6	6	5	5	4
YELLOW	3	2	1	3	2	2	1	1
RED	6	5	4	3	2	2	1	1



Transceiver and Linear Power Amplifier Installation Connections
Figure 5

Table 1. Connector Signal Parameters.

CONNECTOR	SIGNAL PARAMETER
Microphone (mates with PJ-068)	Tip—ptt line; ground to transmit Ring—microphone audio; low-impedance input (270 Ω), approx 5 mV in for full power output Barrel—common ground
Headphones (mates with PJ-055)	Tip—receiver audio; 4- to 8-Ω impedance, up to 4-W output Barrel—ground
External SPKR (mates with PJ-055)	Tip—receiver audio; 4- to 8-Ω impedance, up to 4-W output Barrel—ground
CW KEY (mates with PJ-055)	Tip—keying line; ground to transmit Barrel—ground
J2 Line audio in (mates with phono plug)	600 Ω, unbalanced; 40-mV input produces 100-W rf output

Table 1. Connector Signal Parameters (Cont).

CONNECTOR	SIGNAL PARAMETER
J3 ALC (mates with phono plug)	Input for negative ALC voltage from external power amplifier
J4 Antenna relay (mates with phono plug)	External access to receiver contacts of internal antenna transfer relay. Internally jumpered to J8. (Cut jumper if used.)
J5 Transverter (mates with phono plug)	Approximately 200-mW (100-mW, min) output from exciter into 50-ohm load. (To obtain output, connect this line to dc ground through a 1-mH rf choke.)
J6 Line audio out (mates with phono plug)	600 Ω, unbalanced; -10 dB mW at AGC threshold. Level is independent of audio gain control.
J7 Ampl control (mates with phono plug)	Normally open relay contacts; contacts grounded in transmit. 2 A, 28 V dc or 0.75 A, 115 V ac capacity.
J8 Rcvr antenna input (mates with phono plug)	Direct input to receiver front end. Bypasses transmit low-pass filters and antenna transfer relay. Internally jumpered to J4. (Cut jumper if used.)
J9 Push-to-talk (mates with phono plug)	Ground to place transceiver in transmit. (Line is connected to +5 V through 10-kΩ resistor.)

grounding

The importance of a good ground system cannot be overemphasized. All units of the system should have ground interconnections through heavy wire (#12 AWG or larger) or ground strap (6-mm (1/4-in) wide or larger) between ground lugs. Use as short a length of ground wire or braid as practical between units or external ground.

Connect the KWM-380 ground lug on the rear to a good earth or water-pipe ground.

Before using a water-pipe ground, check to make sure that no plastic, rubber, or other such insulating sections will interrupt the electrical continuity to ground. Install a jumper around any insulating sections found. Use heavy copper wire or ground braid and metal pipe clamps.

antennas

The antenna is one of the most important parts in the performance of any radio communications system. System performance is directly related to the efficiency of the antenna. Because each individual installation has unique characteristics, various types of antennas, their characteristics, and installation information cannot be covered in this manual. A number of excellent reference works on antennas are available.

The KWM-380 is designed to operate into a nonreactive rf load of 50 ohms. Impedance mismatches producing vswr's lower than 2:1 are acceptable. For vswr's 2:1 or greater, the transceiver power amplifier output is automatically reduced in proportion to the reflected power.

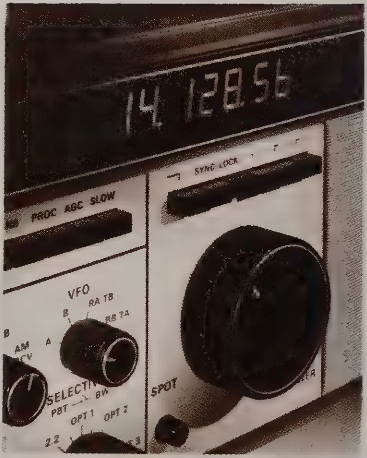
OPERATION

introduction

Controls on the KWM-380 have been labeled so that their function is self-explanatory. After referring to figures 6 and 7 and tables 2 and 3, many operators will need no further explanation. The following paragraphs summarize operation of several of the controls and give check lists for initial control settings for each operating mode.

frequency selection

The large tuning knob and row of switches immediately above it control the transceiver frequency selection. When power is applied to the transceiver, the frequency is automatically set to 15.000 00 MHz. Frequency data is not retained in the vfo registers when power is turned off.



TPA-1667-017

There is no need for a bandswitch since selection of the MHz tuning increment permits tuning from 0 to 29 MHz in 1-1/2 turns of the knob. This rate is effective for the MHz digits only. Selecting other increments automatically switches the tuning rate to 200 steps per turn. For example, selecting the 100-Hz increment gives 20 kHz per revolution of the tuning knob.

When a switch is depressed to select a frequency increment to be changed, that and all higher increments will change as the tuning knob rotates. For example, if the 100-Hz increment is selected, the 10-Hz digit remains where last set. Rotating the tuning knob clockwise causes the 100-Hz digits to increment up through 9, index the 1-kHz digit by one, and roll around to 0 to continue incrementing toward 9 again. Counterclockwise rotation causes the frequency to decrement in a similar fashion.

Once a chosen frequency is selected, pressing the LOCK switch to the in position electronically disables the tuning knob operation. In LOCK, rotation of the tuning knob has no effect on the frequency. To restore tuning control to the knob, press the LOCK switch to return it to the out position.

The SYNC switch is momentary and when depressed, will load the displayed frequency value from the operating vfo register into the register that is not being displayed. For example, if using register B, depressing SYNC will load the same frequency into register A. The frequency in register B can then be changed without affecting the stored value in register A.

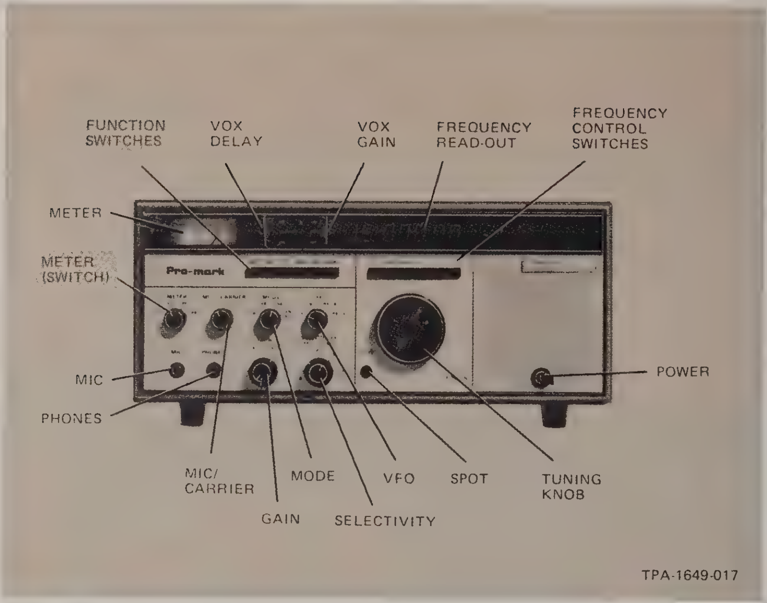
The A and B vfo registers may contain any two frequencies. Split-frequency operation is achieved by selecting RA-TB or RB-TA. With RA-TB chosen, the transceiver will receive on the frequency in the A register and transmit on the frequency in the B register. The frequency display shows the receive frequency when receiving and the transmit frequency when transmitting.

The vfo's can be set up for split-frequency operation on any two frequencies, even within separate bands.

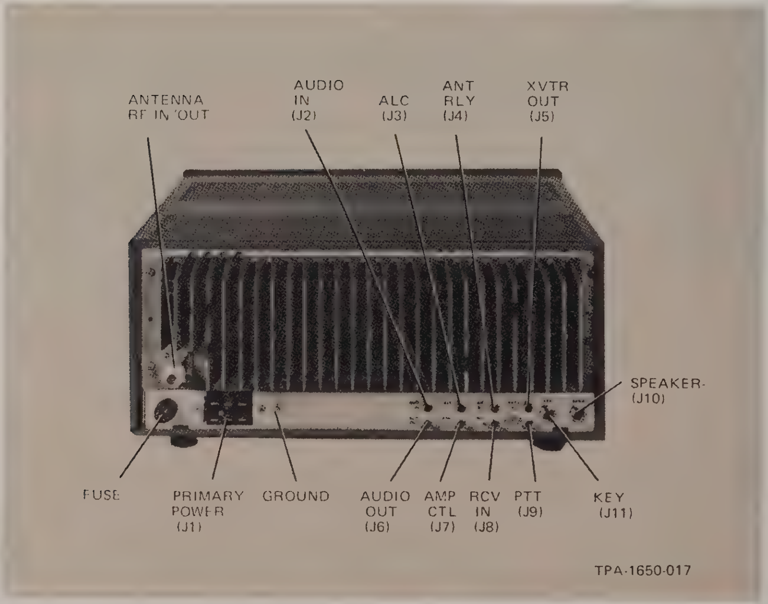
In CW operation, the SPOT switch enables an 800-Hz tone that is applied to the receiver audio output. By tuning the received signal so the CW audio frequency matches the 800-Hz SPOT frequency, the receiver frequency will be matched with the transmitted frequency.

Table 2. Front Panel Controls and Indicators.

ITEM	FUNCTION
METER (switch)	Selects signal applied to meter during transmit.
ALC	Transmitter automatic level control voltage.
VC	Collector voltage for final amplifier stage.
PF	Forward rf power sampled at amplifier output.



Front Panel Controls and Indicators
Figure 6



Rear Panel Connectors
Figure 7

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
PR	Reflected rf power sampled at amplifier output.
Meter	In receive, indicates relative signal strength in "S" units. (Rf input of 100 μV "hard" (50 μV "soft") gives S9 indication.) In transmit, indicates signal selected by METER switch.
Function switches	Selects related function when switch depressed.
MOX	Manually operated receive-to-transmit switching. Places transceiver in transmit when pressed in.
VOX	Voice operated receive-to-transmit switching. Ptt switching also operable.
NB	Noise blanker.
PROC	Speech processor.
AGC	Receiver automatic gain control.
SLOW	Selects slow AGC action when depressed; fast AGC when out. (AGC switch must be depressed for fast/slow action to be enabled).
DELAY	Adjustments for transmit-to-receive switching time delay.
CW	Delay between last key-up action and receive mode.
SSB	Delay between last microphone VOX input and receive mode.
GAIN	Adjusts levels at which receive-to-transmit switching occurs.
VOX	Voice or line audio input signals.
ANTI	Speaker-to-microphone signals.
Frequency readout	Displays frequency in 10-Hz increments.
Frequency control switches	Selects frequency increments affected by tuning knob. Continuous tuning for any increment with roll-around at end limits.

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
─┐	1-MHz increments.
SYNC	Loads displayed frequency in nonselected vfo register to synchronize both vfo frequencies.
LOCK	Dial lock prevents tuning knob from changing frequency when rotated.
|	1-kHz increments.
┌ (left)	100-Hz increments.
┌ (right)	10-Hz increments.
POWER	Primary power switch.
Tuning knob	Frequency selection control. (Provides 200 increments per revolution for all except MHz steps at 20 increments per revolution.) Works in conjunction with switches above knob.
SPOT	In CW mode only, enables 800-Hz tone to which received CW tone is matched to spot transmitted frequency to exact received frequency.
VFO	Selects frequency-storage register.
A	A register. Transmit and receive on same frequency.
B	B register. Transmit and receive on same frequency.
RA-TB	Receive on A register frequency - transmit on B register frequency.
RB-TA	Receive on B register frequency - transmit on A register frequency.
SELECTIVITY	Controls selectivity of receiver.
PBT (small knob)	Passband tuning. Used to select USB, LSB, or CW during receive mode. Continuously varies position of passband (bandwidth selected by BW control) within 8-kHz passband of first if filter.

Table 2. Front Panel Controls and Indicators (Cont).

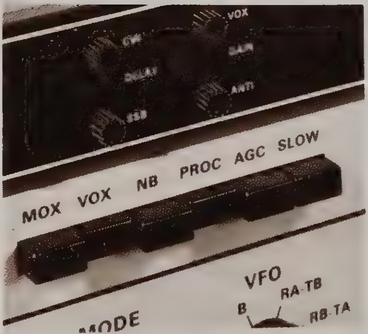
ITEM	FUNCTION
BW (large knob)	Selects filter bandwidth.
8.0	8.0-kHz filter (for AM, also selects optional 6-kHz AM filter if installed).
2.2	2.2-kHz filter (for normal SSB).
OPT 1, 2, 3	Three positions for optional filters.
MODE	Selects mode of transmit operation.
CW	Continuous wave.
USB	Upper sideband. Receive sideband determined by setting of PBT control.
LSB	Lower sideband.
AM RCV	Amplitude modulation in receive only. Transmitter does not operate in AM mode.
GAIN	Adjusts gain of receiver circuits.
AF (small knob)	Af amplifier gain.
RF (large knob)	Rf amplifier gain.
MIC/CARRIER	In sideband operation adjusts microphone amplifier gain. In CW operation adjusts rf carrier level.
PHONES	Output jack for low-impedance (4- to 8-Ω) headphones. Connecting phones inhibits speaker and SPKR (on rear panel) outputs.
MIC	Input jack for low-impedance, dynamic microphone. Jack is also wired for ptt signal.

Table 3. Rear Panel Connectors.

ITEM	FUNCTION
Antenna	Rf connector (type S0-239) for coaxial cable connection to antenna coupler.
Fuse	Primary power fuse (8 A for 110 V, 4 A for 220 V).
J1	Primary power connector.
Ground	Stud for earth-ground connection.
AUD IN (J2)	Input for 600-ohm, unbalanced line audio.
ALC (J3)	Negative ALC input signal from external power amplifier.
ANT RLY (J4)	Receive contacts of internal antenna transfer relay. (Jumpered to RCV IN (J8) if separate receive antenna not used.)
XVTR OUT (J5)	Exciter output signal for use with transmitting converter.
AUD OUT (J6)	Output for 600-ohm, unbalanced line audio.
AMP CTL (J7)	Relay contacts for tr-switching external power amplifier. (Contacts grounded in transmit mode.)
RCV IN (J8)	Receiver front end signal input. Bypasses antenna transfer relay and transmit low-pass filters. (Jumpered to ANT RLY (J4) if separate receive antenna not used.)
PTT (J9)	Push-to-talk switch input. Ground to command transmit operation.
KEY (J10)	CW key input.
SPKR (J11)	Output for 4- to 8-ohm speaker. Disconnects internal speaker when external speaker connected. (Inhibited when headphones connected to PHONES jack on front panel.)

function switches

Depressing the MOX or VOX switch selects manual- or voice-operated keying, respectively. The rear panel PTT jack (J9), when grounded, will key the transmitter regardless of MOX or VOX selection.



TPA-1668-017

When pressed to the in position, the MOX switch keeps the transceiver continuously keyed. For normal transmit-receive operation, the MOX switch must be out. With MOX and VOX both out, the transceiver is keyed with the microphone ptt switch. Selecting VOX enables voice keying in sideband or CW keying in CW.

The AGC function can be enabled by depressing the AGC switch. The out position inhibits AGC operation. Release time of the AGC is controlled by the SLOW switch. The in position selects a slow release time. This is normally used in SSB operation. Fast AGC release, the switch out position, is more useful for CW reception.

The optional noise blanker and speech processor circuits, when installed, are selected by depressing the respective NB or PROC switch to the in position. The noise blanker reduces or eliminates pulse-type noise, such as from automobile ignition systems, from the receiver audio output. The speech processor increases the ratio of average to peak power in the rf output signal. This increases talk power and may be desired in DX operation.

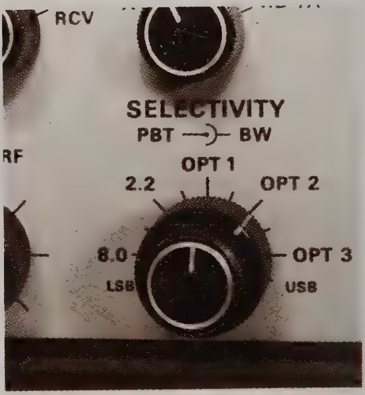
The DELAY controls adjust the time the transceiver is held in the transmit mode after the voice input or CW keying signal is removed. Clockwise adjustment of either control increases the delay between the last input and automatic transmit-to-receive switching. Independently set these controls as desired for the preferred delay times.

The GAIN controls adjust the sensitivity to microphone input signals from the operator (VOX) or from the receiver speaker (ANTI-VOX). Set the VOX GAIN so the normal voice level used during transmitting keeps the transceiver keyed. A level too high may cause background noises to key the transmitter while a level too low will require a loud voice input to the microphone for keying. Set the ANTI-VOX GAIN to a level that prevents the microphone pickup of the speaker output from tripping the VOX circuit.

selectivity

The large (rear) BW switch controls the receive bandwidth by selecting any one of the installed filters.

The small (front) PBT control positions the passband of the selected filter within the 10-kHz passband of the receiver first if and is used to select the desired sideband in receive. For LSB, position the pointer to near 2.2. For USB, position the pointer to near OPT 2.



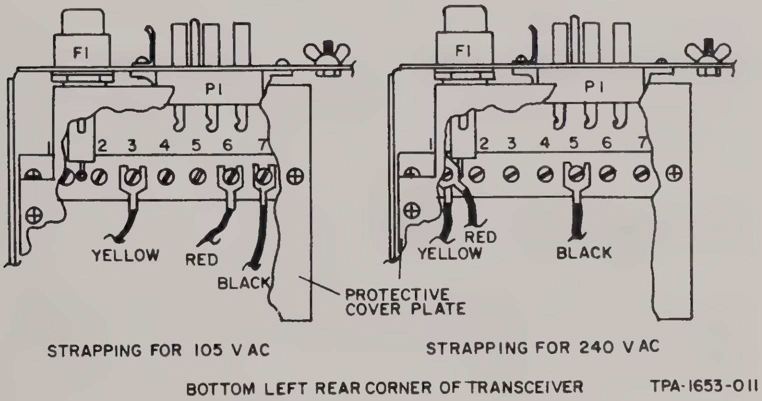
TPA-1666-017

NOTE **The MODE switch does not determine which sideband is received. It only selects the desired transmit passband.**

The PBT control can shift the position of the receive selectivity by adjusting the passband above or below the normal frequency position. By adjusting the PBT control toward the left of center, the filter passband is shifted to a lower frequency. Positions right of center shift the passband to a higher frequency. Figure 8 illustrates this. Figure 9 illustrates how the passband can be tuned away from an interfering signal to put the signal outside the passband and eliminate the interference.

Determine the average ac voltage at the primary power outlet where the transceiver is to be used. Remove the chassis dust cover and locate the protective cover plate near the left rear corner as viewed with chassis upside down. Remove the cover plate and refer to the preceding chart to make the connections indicated for the voltage nearest the primary power outlet voltage. If the outlet voltage is approximately halfway between two voltages listed, strap TB1 for the lower voltage.

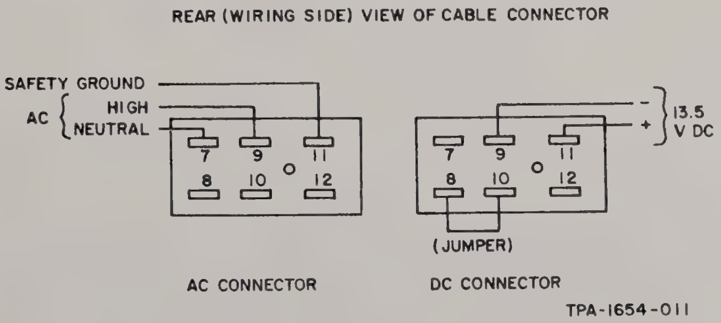
Figure 2 shows TB1 correctly strapped for 105 or 240 volts.



TB1 Strapping for 105 Volts or 240 Volts
Figure 2

dc voltage operation

The KWM-380 will also accept 12 to 15 volts dc for backup emergency power. The primary power connector must be strapped as shown in figure 3. Power requirements are nominally 3 A in receive and 20 A in transmit.



Power Connector Strapping for AC or DC Operation
Figure 3

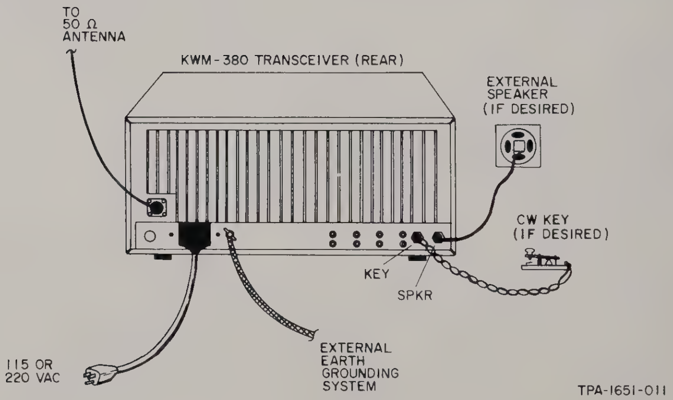
operating location

The normal operating location should be chosen so the transceiver is away from heat vents and normal airflow around it is unobstructed. Do not lay objects on top or against the sides. It is especially important that the heat sink have a free flow of air about it. An automatic turndown circuit will reduce the rf output power if the heat sink overheats. This is for self-protection of the power amplifier final output stages.

The AC-2808 Blower Kit is available for attaching to the heat sink. This blower supplies cooling air to permit normal operation in close quarters or high-duty cycle operation.

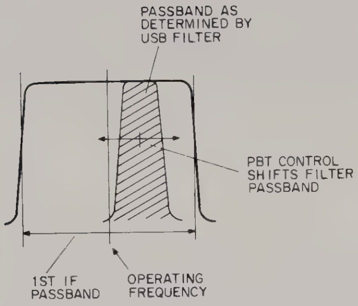
system interconnections

Figures 4 and 5 show typical hookups. Table 1 lists the signal parameters for all front and rear connectors except the primary power and rf input/output.



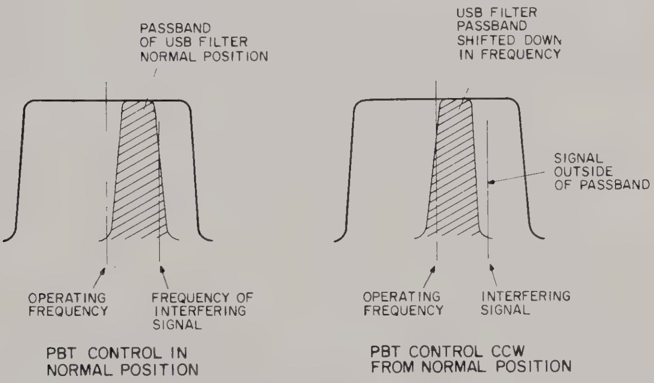
TO 50 Ω ANTENNA
KWM-380 TRANSCEIVER (REAR)
EXTERNAL SPEAKER (IF DESIRED)
CW KEY (IF DESIRED)
KEY
SPKR
115 OR 220 VAC
EXTERNAL EARTH GROUNDING SYSTEM
TPA-1651-011

Transceiver Installation Connections
Figure 4


PASSBAND AS DETERMINED BY USB FILTER
PBT CONTROL SHIFTS FILTER PASSBAND
1ST IF PASSBAND
OPERATING FREQUENCY

TPA-1665-011

Filter Passband Positioning With PBT Control
Figure 8


PASSBAND OF USB FILTER NORMAL POSITION
USB FILTER PASSBAND SHIFTED DOWN IN FREQUENCY
SIGNAL OUTSIDE OF PASSBAND
OPERATING FREQUENCY
FREQUENCY OF INTERFERING SIGNAL
OPERATING FREQUENCY
INTERFERING SIGNAL
PBT CONTROL IN NORMAL POSITION
PBT CONTROL CCW FROM NORMAL POSITION

TPA-1664-011

Passband Tuning To Eliminate Interfering Signal
Figure 9

mic/carrier

The MIC/CARRIER control adjusts the audio modulation level or the CW carrier level to control the rf output power. For voice operation, set the METER switch to ALC. Key the transmitter and speak into the microphone or say "Ahhhh" in a normal operating-voice level while adjusting the MIC/CARRIER control until the meter indicates +10 to +20 dB over S9 on the S-unit scale. A more counterclockwise position of the control will give less than this full power output setting.

For CW operation, set the METER switch to PF. Key the transmitter and adjust the MIC/CARRIER control clockwise until no further increase in power is noted. A more counterclockwise position of the control will give less than this full power setting.

operating check lists

Adjustments of the KWM-380 controls will vary with individual operators. The following check lists give initial control settings for each mode of operation. After setting up the transceiver, the controls may be adjusted as desired during operation.

These check lists assume that the equipment is properly installed, the microphone or CW key connected, and the DELAY and GAIN controls adjusted.

CW operation

- Turn on POWER.
- Set MODE to CW.
- Select VFO A or B.
- Adjust RF and AF GAIN to desired levels.
- Select desired BW.
- Set PBT to midrange (vertical position).
- Select unused frequency near desired operating frequency.
- Set METER to PF.
- Select VOX function.

- Key transceiver and adjust MIC/CARRIER to power output level desired (normally until power does not increase with continued increase in MIC/CARRIER level).

- Release key and tune to operating frequency.

SSB operation

- Turn on POWER.

- Set MODE to LSB or USB, as desired for band of operation.

- Select VFO A or B.

- Adjust RF and AF GAIN to desired levels.

- Select 2.2-kHz bw.

- Set PBT to second index mark to left (LSB) or right (USB) of top center.

- Select unused frequency near desired operating frequency.

- Set METER to ALC.

- Press in VOX function switch if ptt operation not desired.

- Key transmitter and speak into microphone while adjusting MIC/CARRIER to power output level desired (normally to level where meter indicates +10 to +20 dB over S9 on S-unit scale).

- Unkey and tune to operating frequency.

RTTY operation

- Make sure microphone is disconnected.

- Turn on POWER.

- Set MODE to LSB.

- Select VFO A or B.

- Adjust RF and AF GAIN to desired levels.
- Select 2.2-kHz bw.
- Set PBT to second index mark to left of top center.
- Set METER to PF.
- Select unused frequency near desired operating frequency.
- Press in MOX function switch (transceiver keys).
- Adjust MIC/CARRIER to power output level desired (normally until power does not increase with continued increase in MIC/CARRIER level).
- Press MOX function to release to out (unkeyed) position.
- Tune to operating frequency.

MAINTENANCE

Without extensive test equipment, only a limited amount of maintenance can be performed. The following information lists the replaceable fuses and lamps, and guides in determining general functional areas in which a detected malfunction may be located. Only a multimeter and rf voltmeter are required for the tests.

replaceable fuses and lamps

Primary power (located on rear panel) — 8 A, AGC for 110 V; 4 A, AGC for 220 V.

13-volt supply (two fuses located on power supply card under chassis) — 2 A, AGC.

Panel meter lamps (wired into holder at top rear of meter) — T1 3/4, 14 V, 100 mA, type 7373.

front-panel troubleshooting

INDICATION	POSSIBLE CAUSE	TROUBLESHOOT
Rapid beeping in speaker	Synthesizer unlocked.	Check 5-, 9-, and 24-V supply outputs. Check synthesizer output levels.
No audio output	Receiver audio circuits malfunctioning.	Check 13-V supply fuses.
	Synthesizer outputs weak/absent.	Check synthesizer output levels.
	High loss in low-pass filters or antenna transfer relay.	Connect receiver antenna to RCV IN jack on rear panel. (Bypasses antenna transfer relay and low-pass filters.)
No rf output	Power amplifier circuits malfunction.	Check for 3 V rms (at full carrier gain) at J1 on rcvr-extr board. Check synthesizer output levels.

synthesizer output levels

Refer to figure 10 for connector locations on rcvr-extr board. The following measurements are made with an rf voltmeter.

455 kHz (J10) in SSB receive — greater than 50 mV rms.

454.2 kHz (J11) in CW receive — greater than 50 mV rms.

39.6 MHz (J3) in receive or transmit — approximately 0.5 V rms.

1st mixer injection (J2) in receive or transmit — approximately 0.5 V rms.

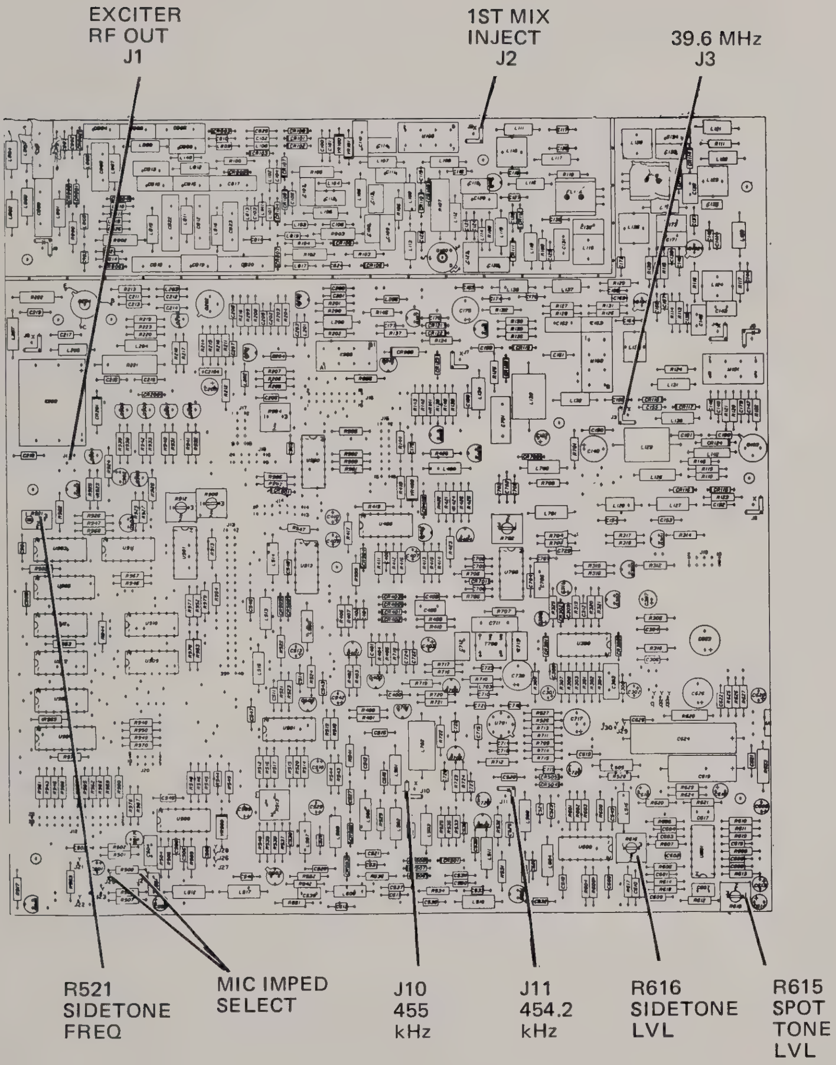
receiver-exciter sidetone and spot potentiometer adjustments

Refer to figure 10 for locations of sidetone frequency and level and spot tone level potentiometers. These potentiometers may be adjusted to the level or frequency desired by the operator.

DO NOT MAKE ANY OTHER ADJUSTMENTS ON THE RECEIVER-EXCITER BOARD WITHOUT THE INSTRUCTIONS AND TEST EQUIPMENT SETUP GIVEN IN THE KWM-380 SERVICE MANUAL.

microphone impedance selection

The KWM-380 is factory wired for a low-impedance microphone. A high-impedance microphone may be used, however, by removing a 270-ohm resistor and replacing it with a value between 10 and 47 kΩ that approximately matches the microphone impedance. Refer to figure 10 for the resistor location. Use caution in removing and installing the resistors. Do not apply heat from the soldering iron to the circuit board pads longer than necessary. Excessive heat can damage the circuit board.



TPA-1683-019

Receiver-Exciter Connectors and Adjustments Locations
Figure 10

Rockwell International

Collins Telecommunications
Products Division
Electronic Systems Group

Rockwell International

Collins Telecommunications
Products Division
Electronic Systems Group

523-0769877-001217 10-79 Printed in U.S.A.

ROCKWELL-COLLINS

KWM-380

Owner's Manual

Pro-mark™
The Mark of the Professional

523-0769877-001217
1 October 1979

---

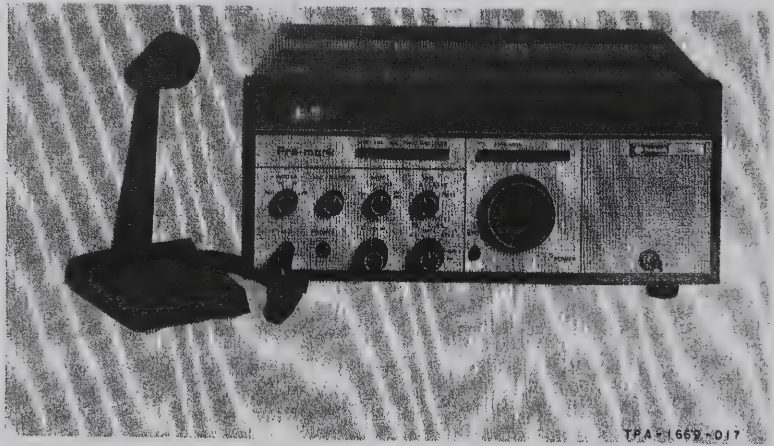
owner's manual

Collins KWM-380 Transceiver

Collins Telecommunications
Products Division
Electronic Systems Group
Rockwell International
Cedar Rapids, Iowa 52406

Printed in the United States of America

introduction



This manual contains operating and installation information for the fully synthesized, all solid-state KWM-380 Transceiver. Full coverage from 29.999 99 down to 0.500 00 MHz is standard in the receiver circuits. Transmission is limited to 1.800 to 2.000, 3.500 to 4.000, 7.000 to 7.300, 14.000 to 14.350, 21.000 to 21.450, and 28.000 to 29.700 MHz in the Amateur Radio Service bands. The pll synthesizer tunes in 10-Hz increments either manually or with an optional remote keypad control. Split vfo is standard, as is the digital frequency display driven directly by the microprocessor.

Because of the uniqueness of each individual station, the installation information found here is limited in scope. In-depth information can be found in numerous publications commonly referred to by amateur radio operators.

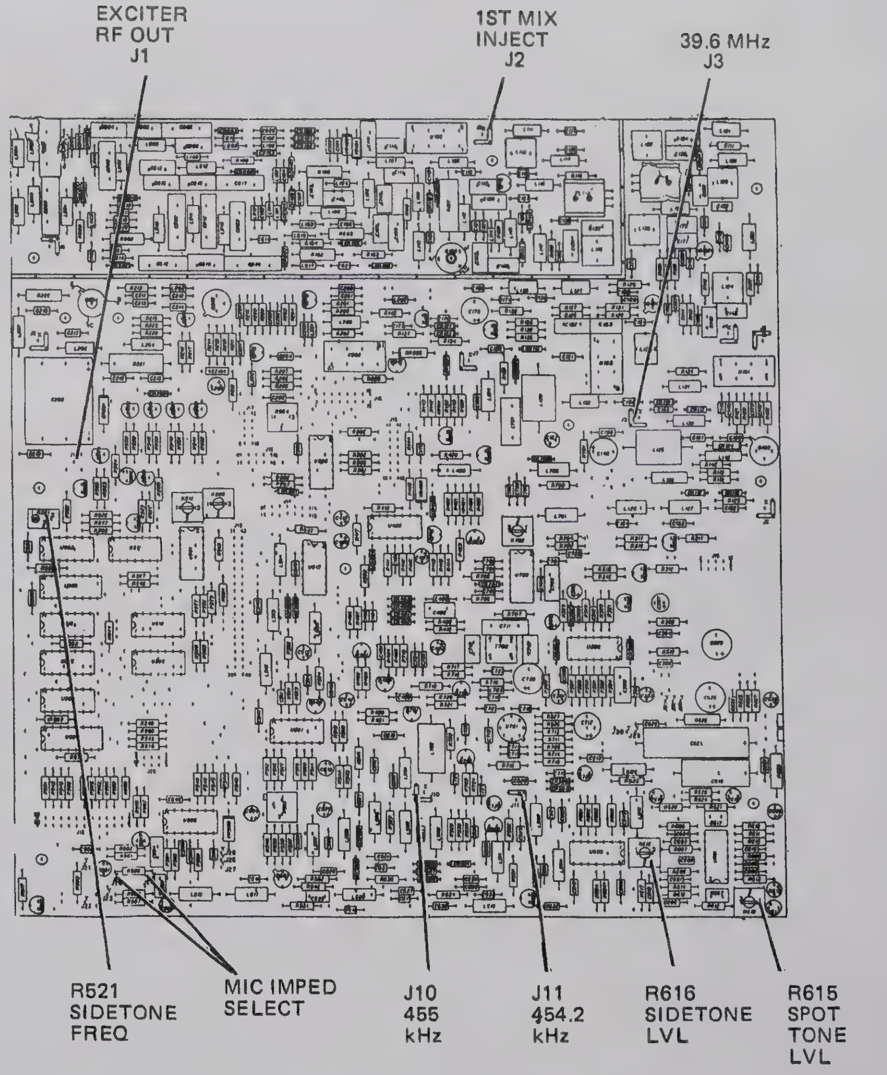
Test procedures in this manual require only simple test equipment to perform. The procedures are a guide in tracing malfunctions to a functionally related group of circuit cards. Detailed tests requiring laboratory-type test equipment and schematic diagrams are included in the KWM-380 Transceiver Service Manual, Collins publication number 523-0769878.

specifications

Physical	
Size	394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep
Weight	21.8 kg (48 lbs) max
Primary power	Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit
Receiver	
Frequency	0.5 to 30.0 MHz, tunable in 10-Hz steps
Modes	USB, LSB, AM, and CW
Sensitivity	0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)
Selectivity (3-dB bandwidth)	Selectable 8 kHz *6 kHz 2.1 kHz *1.7 kHz *400 Hz *200 Hz
If and image rejection	Greater than 60 dB

---

*Optional filters



TPA-1683-019

Receiver-Exciter Connectors and Adjustments Locations
Figure 10

synthesizer output levels

Refer to figure 10 for connector locations on rcvr-extr board. The following measurements are made with an rf voltmeter.

455 kHz (J10) in SSB receive — greater than 50 mV rms.

454.2 kHz (J11) in CW receive — greater than 50 mV rms.

39.6 MHz (J3) in receive or transmit — approximately 0.5 V rms.

1st mixer injection (J2) in receive or transmit — approximately 0.5 V rms.

receiver-exciter sidetone and spot potentiometer adjustments

Refer to figure 10 for locations of sidetone frequency and level and spot tone level potentiometers. These potentiometers may be adjusted to the level or frequency desired by the operator.

DO NOT MAKE ANY OTHER ADJUSTMENTS ON THE RECEIVER-EXCITER BOARD WITHOUT THE INSTRUCTIONS AND TEST EQUIPMENT SETUP GIVEN IN THE KWM-380 SERVICE MANUAL.

microphone impedance selection

The KWM-380 is factory wired for a low-impedance microphone. A high-impedance microphone may be used, however, by removing a 270-ohm resistor and replacing it with a value between 10 and 47 kΩ that approximately matches the microphone impedance. Refer to figure 10 for the resistor location. Use caution in removing and installing the resistors. Do not apply heat from the soldering iron to the circuit board pads longer than necessary. Excessive heat can damage the circuit board.

Intermodulation distortion	-50 dB or better for two signals of -10 dB mW each, 20 kHz apart
AGC	Audio output variation not more than 8 dB for 2-μV to 100-mV open circuit rf input variation
Audio output	Not less than 3.5 W into 4-ohm load, at 1 kHz, at not more than 10% total harmonic distortion Line audio output: -10 dB mW nominal into 600 ohms Frequency response: 300 to 2400 Hz with not more than 5 dB variation
Transmitter	
Frequency	160- through 10-m amateur bands, tunable in 10-Hz steps 160 m 1.800 - 2.000 MHz 80/75 m 3.500 - 4.000 MHz 40 m 7.000 - 7.300 MHz 20 m 14.000 - 14.350 MHz 15 m 21.000 - 21.450 MHz 10 m 28.000 - 29.700 MHz
Modes	USB, LSB, and CW
Output power	100 W pep, nominal In CW or RTTY, automatic turn-down to 50 W after 10 seconds, 50 percent duty cycle, key down 15 minutes, max. With optional blower kit installed, power is 100 W average, 50 percent duty cycle, key down 1 hour, max, at 25 °C; 30 minutes, max, at 50 °C for all modes.

Unwanted signal suppression	
Carrier	-50 dB or better
Undesired sideband, 1-kHz ref	-55 dB or better
Harmonics (all)	-40 dB or better
Mixer products	-55 dB or better
Third order distortion	25 dB below each tone of two-tone test
Synthesizer accuracy and stability	Accuracy within ±5 kHz after 10 minutes warm-up when 39.6- and 455-MHz oscillators are set to within ±3 Hz Stability within ±150 Hz over temperature range of 0 to 50 °C
Rf load	50 ohms, nonreactive. Full power output with vswr of 2:1 or less. Automatic power output turndown with vswr greater than 2:1.
Audio inputs	
Microphone	Low impedance, dynamic; internal strapping for high impedance
Line	600 ohm, unbalanced; 40-mV input sufficient for full rf power output

MAINTENANCE

Without extensive test equipment, only a limited amount of maintenance can be performed. The following information lists the replaceable fuses and lamps, and guides in determining general functional areas in which a detected malfunction may be located. Only a multimeter and rf voltmeter are required for the tests.

replaceable fuses and lamps

Primary power (located on rear panel) — 8 A, AGC for 110 V; 4 A, AGC for 220 V.

13-volt supply (two fuses located on power supply card under chassis) — 2 A, AGC.

Panel meter lamps (wired into holder at top rear of meter) — T1 3/4, 14 V, 100 mA, type 7373.

front-panel troubleshooting

INDICATION	POSSIBLE CAUSE	TROUBLESHOOT
Rapid beeping in speaker	Synthesizer unlocked.	Check 5-, 9-, and 24-V supply outputs. Check synthesizer output levels.
No audio output	Receiver audio circuits malfunctioning.	Check 13-V supply fuses.
	Synthesizer outputs weak/absent.	Check synthesizer output levels.
	High loss in low-pass filters or antenna transfer relay.	Connect receiver antenna to RCV IN jack on rear panel. (Bypasses antenna transfer relay and low-pass filters.)
No rf output	Power amplifier circuits malfunction.	Check for 3 V rms (at full carrier gain) at J1 on rcvr-extr board. Check synthesizer output levels.

- Adjust RF and AF GAIN to desired levels.
- Select 2.2-kHz bw.
- Set PBT to second index mark to left of top center.
- Set METER to PF.
- Select unused frequency near desired operating frequency.
- Press in MOX function switch (transceiver keys).
- Adjust MIC/CARRIER to power output level desired (normally until power does not increase with continued increase in MIC/CARRIER level).
- Press MOX function to release to out (unkeyed) position.
- Tune to operating frequency.

INSTALLATION

unpacking

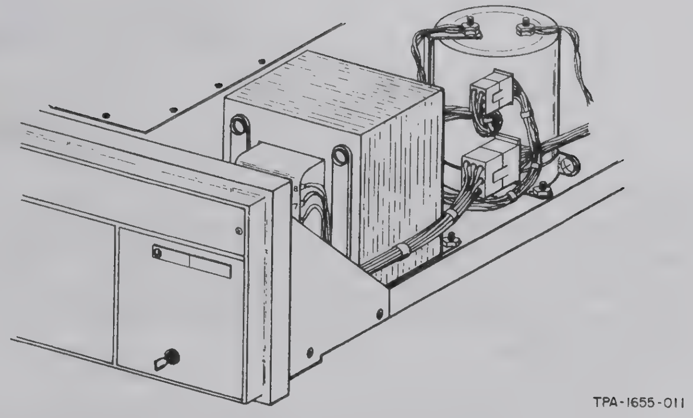
The KWM-380 is shipped in two separate cartons. One contains the power transformer, the other contains the transceiver. After carefully unpacking the cartons, check to be sure no shipping damage is evident. Should any damage be apparent, save the cartons and notify the delivery carrier immediately to file claim for damage.

power transformer installation

To eliminate the possibility of the power transformer breaking loose from the chassis and causing further damage during shipment, it is packaged separately. The transformer is quickly installed in five steps with just a 3/8-in open-end wrench, no 12 (3/8-in) nutdriver, and a Phillips screwdriver.

- Using the screwdriver, remove four screws from the bottom of the transceiver (near the rubber feet at each corner) and slide the dust cover off over the heat sink.
- Remove the front one of the two Phillips-head screws securing the front panel braces to the sides of the chassis and tilt the panel forward.
- Turn the transformer so terminals 1 through 8 face the front panel. With the nutdriver, remove the four nuts and lockwashers from the chassis mounting studs in the right front corner of the chassis and set the transformer over the studs.
- Using the wrench and nutdriver, secure the transformer to the studs with the four lockwashers and nuts.
- Electrically connect the transformer to the transceiver with the two attached polarized connectors. Reattach the front panel, then replace the dust cover.

Figure 1 shows the transformer properly mounted.



Power Transformer Installation
Figure 1

primary power requirements

WARNING

DO NOT ATTEMPT TO CHANGE VOLTAGE STRAPPING WHILE PRIMARY POWER IS APPLIED. ELECTRICAL SHOCK WILL OCCUR. DISCONNECT THE PRIMARY POWER CABLE FROM THE POWER SOURCE OR THE UNIT FIRST.

ac voltage operation

The KWM-380 will operate from various 50- to 60-Hz voltages, depending on the following internal strapping connections.

For input voltages listed, strap TB1 as follows:

WIRE	105	115	125	210	220	230	240	250
BLACK	7	7	7	6	6	5	5	4
YELLOW	3	2	1	3	2	2	1	1
RED	6	5	4	3	2	2	1	1

- Key transceiver and adjust MIC/CARRIER to power output level desired (normally until power does not increase with continued increase in MIC/CARRIER level).
- Release key and tune to operating frequency.

SSB operation

- Turn on POWER.
- Set MODE to LSB or USB, as desired for band of operation.
- Select VFO A or B.
- Adjust RF and AF GAIN to desired levels.
- Select 2.2-kHz bw.
- Set PBT to second index mark to left (LSB) or right (USB) of top center.
- Select unused frequency near desired operating frequency.
- Set METER to ALC.
- Press in VOX function switch if ptt operation not desired.
- Key transmitter and speak into microphone while adjusting MIC/CARRIER to power output level desired (normally to level where meter indicates +10 to +20 dB over S9 on S-unit scale).
- Unkey and tune to operating frequency.

RTTY operation

- Make sure microphone is disconnected.
- Turn on POWER.
- Set MODE to LSB.
- Select VFO A or B.

For CW operation, set the METER switch to PF. Key the transmitter and adjust the MIC/CARRIER control clockwise until no further increase in power is noted. A more counterclockwise position of the control will give less than this full power setting.

operating check lists

Adjustments of the KWM-380 controls will vary with individual operators. The following check lists give initial control settings for each mode of operation. After setting up the transceiver, the controls may be adjusted as desired during operation.

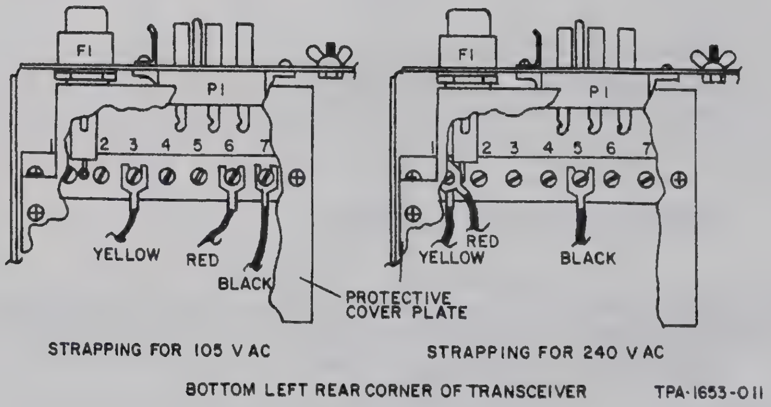
These check lists assume that the equipment is properly installed, the microphone or CW key connected, and the DELAY and GAIN controls adjusted.

CW operation

- Turn on POWER.
- Set MODE to CW.
- Select VFO A or B.
- Adjust RF and AF GAIN to desired levels.
- Select desired BW.
- Set PBT to midrange (vertical position).
- Select unused frequency near desired operating frequency.
- Set METER to PF.
- Select VOX function.

Determine the average ac voltage at the primary power outlet where the transceiver is to be used. Remove the chassis dust cover and locate the protective cover plate near the left rear corner as viewed with chassis upside down. Remove the cover plate and refer to the preceding chart to make the connections indicated for the voltage nearest the primary power outlet voltage. If the outlet voltage is approximately halfway between two voltages listed, strap TB1 for the lower voltage.

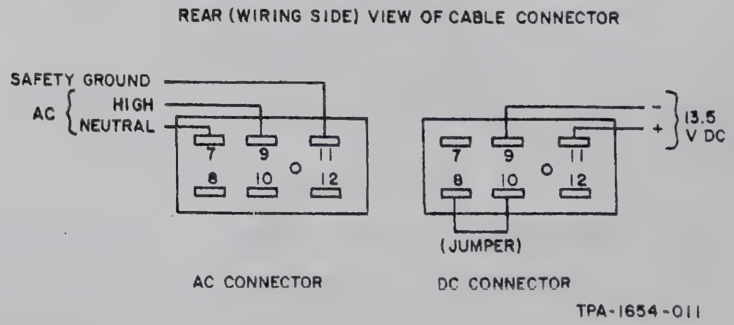
Figure 2 shows TB1 correctly strapped for 105 or 240 volts.



TB1 Strapping for 105 Volts or 240 Volts
Figure 2

dc voltage operation

The KWM-380 will also accept 12 to 15 volts dc for backup emergency power. The primary power connector must be strapped as shown in figure 3. Power requirements are nominally 3 A in receive and 20 A in transmit.



Power Connector Strapping for AC or DC Operation
Figure 3

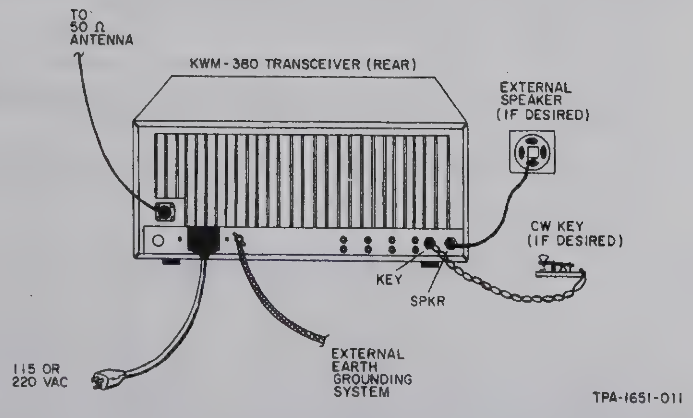
operating location

The normal operating location should be chosen so the transceiver is away from heat vents and normal airflow around it is unobstructed. Do not lay objects on top or against the sides. It is especially important that the heat sink have a free flow of air about it. An automatic turndown circuit will reduce the rf output power if the heat sink overheats. This is for self-protection of the power amplifier final output stages.

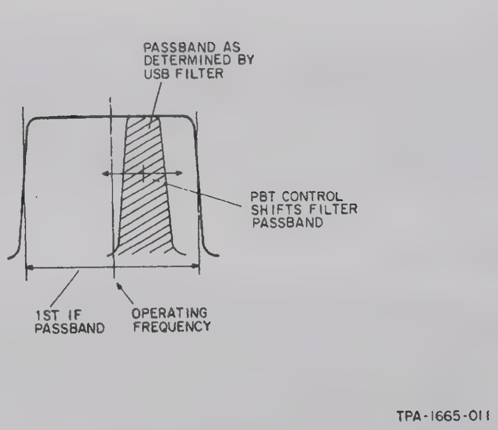
The AC-2808 Blower Kit is available for attaching to the heat sink. This blower supplies cooling air to permit normal operation in close quarters or high-duty cycle operation.

system interconnections

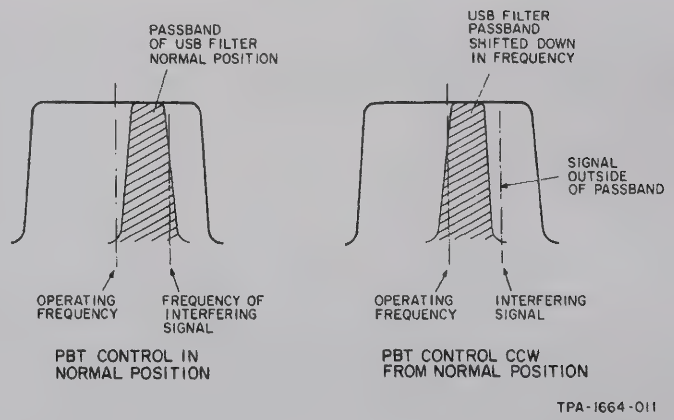
Figures 4 and 5 show typical hookups. Table 1 lists the signal parameters for all front and rear connectors except the primary power and rf input/output.


TO 50 Ω ANTENNA
KWM-380 TRANSCEIVER (REAR)
EXTERNAL SPEAKER (IF DESIRED)
CW KEY (IF DESIRED)
KEY
SPKR
115 OR 220 VAC
EXTERNAL EARTH GROUNDING SYSTEM
TPA-1651-011

Transceiver Installation Connections
Figure 4


PASSBAND AS DETERMINED BY USB FILTER
PBT CONTROL SHIFTS FILTER PASSBAND
1ST IF PASSBAND
OPERATING FREQUENCY
TPA-1665-011

Filter Passband Positioning With PBT Control
Figure 8


PASSBAND OF USB FILTER NORMAL POSITION
OPERATING FREQUENCY
FREQUENCY OF INTERFERING SIGNAL
PBT CONTROL IN NORMAL POSITION
USB FILTER PASSBAND SHIFTED DOWN IN FREQUENCY
SIGNAL OUTSIDE OF PASSBAND
OPERATING FREQUENCY
INTERFERING SIGNAL
PBT CONTROL CCW FROM NORMAL POSITION
TPA-1664-011

Passband Tuning To Eliminate Interfering Signal
Figure 9

mic/carrier

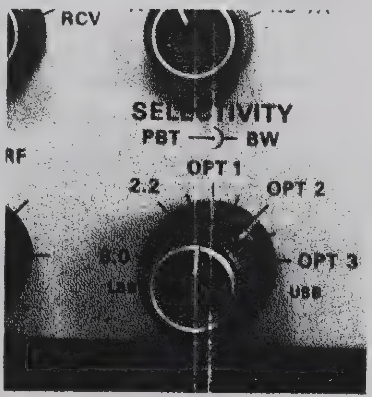
The MIC/CARRIER control adjusts the audio modulation level or the CW carrier level to control the rf output power. For voice operation, set the METER switch to ALC. Key the transmitter and speak into the microphone or say "Ahhhh" in a normal operating-voice level while adjusting the MIC/CARRIER control until the meter indicates +10 to +20 dB over S9 on the S-unit scale. A more counterclockwise position of the control will give less than this full power output setting.

The GAIN controls adjust the sensitivity to microphone input signals from the operator (VOX) or from the receiver speaker (ANTI-VOX). Set the VOX GAIN so the normal voice level used during transmitting keeps the transceiver keyed. A level too high may cause background noises to key the transmitter while a level too low will require a loud voice input to the microphone for keying. Set the ANTI-VOX GAIN to a level that prevents the microphone pickup of the speaker output from tripping the VOX circuit.

selectivity

The large (rear) BW switch controls the receive bandwidth by selecting any one of the installed filters.

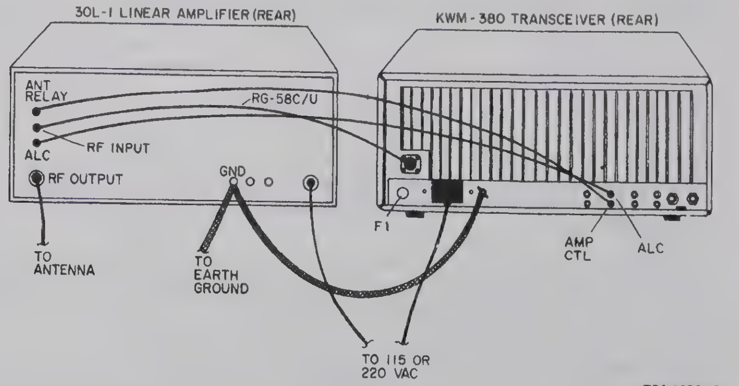
The small (front) PBT control positions the passband of the selected filter within the 10-kHz passband of the receiver first if and is used to select the desired sideband in receive. For LSB, position the pointer to near 2.2. For USB, position the pointer to near OPT 2.



TPA-1666-017

NOTE **The MODE switch does not determine which sideband is received. It only selects the desired transmit passband.**

The PBT control can shift the position of the receive selectivity by adjusting the passband above or below the normal frequency position. By adjusting the PBT control toward the left of center, the filter passband is shifted to a lower frequency. Positions right of center shift the passband to a higher frequency. Figure 8 illustrates this. Figure 9 illustrates how the passband can be tuned away from an interfering signal to put the signal outside the passband and eliminate the interference.



TPA-1652-011

Transceiver and Linear Power Amplifier Installation Connections
Figure 5

Table 1. Connector Signal Parameters.

CONNECTOR	SIGNAL PARAMETER
Microphone (mates with PJ-068)	Tip—ptt line; ground to transmit
	Ring—microphone audio; low-impedance input (270 Ω), approx 5 mV in for full power output
	Barrel—common ground
Headphones (mates with PJ-055)	Tip—receiver audio; 4- to 8-Ω impedance, up to 4-W output
	Barrel—ground
External SPKR (mates with PJ-055)	Tip—receiver audio; 4- to 8-Ω impedance, up to 4-W output
	Barrel—ground
CW KEY (mates with PJ-055)	Tip—keying line; ground to transmit
	Barrel—ground
J2 Line audio in (mates with phono plug)	600 Ω, unbalanced; 40-mV input produces 100-W rf output

Table 1. Connector Signal Parameters (Cont).

CONNECTOR	SIGNAL PARAMETER
J3 ALC (mates with phono plug)	Input for negative ALC voltage from external power amplifier
J4 Antenna relay (mates with phono plug)	External access to receiver contacts of internal antenna transfer relay. Internally jumpered to J8. (Cut jumper if used.)
J5 Transverter (mates with phono plug)	Approximately 200-mW (100-mW, min) output from exciter into 50-ohm load. (To obtain output, connect this line to dc ground through a 1-mH rf choke.)
J6 Line audio out (mates with phono plug)	600 Ω, unbalanced; -10 dB mW at AGC threshold. Level is independent of audio gain control.
J7 Ampl control (mates with phono plug)	Normally open relay contacts; contacts grounded in transmit. 2 A, 28 V dc or 0.75 A, 115 V ac capacity.
J8 Rcvr antenna input (mates with phono plug)	Direct input to receiver front end. Bypasses transmit low-pass filters and antenna transfer relay. Internally jumpered to J4. (Cut jumper if used.)
J9 Push-to-talk (mates with phono plug)	Ground to place transceiver in transmit. (Line is connected to +5 V through 10-kΩ resistor.)

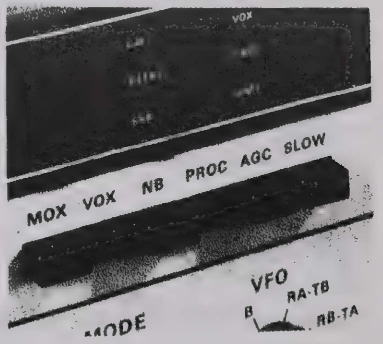
grounding

The importance of a good ground system cannot be overemphasized. All units of the system should have ground interconnections through heavy wire (#12 AWG or larger) or ground strap (6-mm (1/4-in) wide or larger) between ground lugs. Use as short a length of ground wire or braid as practical between units or external ground.

Connect the KWM-380 ground lug on the rear to a good earth or water-pipe ground.

Before using a water-pipe ground, check to make sure that no plastic, rubber, or other such insulating sections will interrupt

function switches



TPA-1668-017

Depressing the MOX or VOX switch selects manual- or voice-operated keying, respectively. The rear panel PTT jack (J9), when grounded, will key the transmitter regardless of MOX or VOX selection.

When pressed to the in position, the MOX switch keeps the transceiver continuously keyed. For normal transmit-receive operation, the MOX switch must be out. With MOX and VOX both out, the transceiver is keyed with the microphone ptt switch. Selecting VOX enables voice keying in sideband or CW keying in CW.

The AGC function can be enabled by depressing the AGC switch. The out position inhibits AGC operation. Release time of the AGC is controlled by the SLOW switch. The in position selects a slow release time. This is normally used in SSB operation. Fast AGC release, the switch out position, is more useful for CW reception.

The optional noise blanker and speech processor circuits, when installed, are selected by depressing the respective NB or PROC switch to the in position. The noise blanker reduces or eliminates pulse-type noise, such as from automobile ignition systems, from the receiver audio output. The speech processor increases the ratio of average to peak power in the rf output signal. This increases talk power and may be desired in DX operation.

The DELAY controls adjust the time the transceiver is held in the transmit mode after the voice input or CW keying signal is removed. Clockwise adjustment of either control increases the delay between the last input and automatic transmit-to-receive switching. Independently set these controls as desired for the preferred delay times.

Table 3. Rear Panel Connectors.

ITEM	FUNCTION
Antenna	Rf connector (type S0-239) for coaxial cable connection to antenna coupler.
Fuse	Primary power fuse (8 A for 110 V, 4 A for 220 V).
J1	Primary power connector.
Ground	Stud for earth-ground connection.
AUD IN (J2)	Input for 600-ohm, unbalanced line audio.
ALC (J3)	Negative ALC input signal from external power amplifier.
ANT RLY (J4)	Receive contacts of internal antenna transfer relay. (Jumpered to RCV IN (J8) if separate receive antenna not used.)
XVTR OUT (J5)	Exciter output signal for use with transmitting converter.
AUD OUT (J6)	Output for 600-ohm, unbalanced line audio.
AMP CTL (J7)	Relay contacts for tr-switching external power amplifier. (Contacts grounded in transmit mode.)
RCV IN (J8)	Receiver front end signal input. Bypasses antenna transfer relay and transmit low-pass filters. (Jumpered to ANT RLY (J4) if separate receive antenna not used.)
PTT (J9)	Push-to-talk switch input. Ground to command transmit operation.
KEY (J10)	CW key input.
SPKR (J11)	Output for 4- to 8-ohm speaker. Disconnects internal speaker when external speaker connected. (Inhibited when headphones connected to PHONES jack on front panel.)

the electrical continuity to ground. Install a jumper around any insulating sections found. Use heavy copper wire or ground braid and metal pipe clamps.

antennas

The antenna is one of the most important parts in the performance of any radio communications system. System performance is directly related to the efficiency of the antenna. Because each individual installation has unique characteristics, various types of antennas, their characteristics, and installation information cannot be covered in this manual. A number of excellent reference works on antennas are available.

The KWM-380 is designed to operate into a nonreactive rf load of 50 ohms. Impedance mismatches producing vswr's lower than 2:1 are acceptable. For vswr's 2:1 or greater, the transceiver power amplifier output is automatically reduced in proportion to the reflected power.

OPERATION

introduction

Controls on the KWM-380 have been labeled so that their function is self-explanatory. After referring to figures 6 and 7 and tables 2 and 3, many operators will need no further explanation. The following paragraphs summarize operation of several of the controls and give check lists for initial control settings for each operating mode.

frequency selection

The large tuning knob and row of switches immediately above it control the transceiver frequency selection. When power is applied to the transceiver, the frequency is automatically set to 15.000 00 MHz. Frequency data is not retained in the vfo registers when power is turned off.

TPA-1667-017

There is no need for a bandswitch since selection of the MHz tuning increment permits tuning from 0 to 29 MHz in 1-1/2 turns of the knob. This rate is effective for the MHz digits only. Selecting other increments automatically switches the tuning rate to 200 steps per turn. For example, selecting the 100-Hz increment gives 20 kHz per revolution of the tuning knob.

When a switch is depressed to select a frequency increment to be changed, that and all higher increments will change as the tuning knob rotates. For example, if the 100-Hz increment is selected, the 10-Hz digit remains where last set. Rotating the tuning knob clockwise causes the 100-Hz digits to increment up through 9, index the 1-kHz digit by one, and roll around to 0 to continue incrementing toward 9 again. Counterclockwise

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
BW (large knob)	Selects filter bandwidth.
8.0	8.0-kHz filter (for AM, also selects optional 6-kHz AM filter if installed).
2.2	2.2-kHz filter (for normal SSB).
OPT 1, 2, 3	Three positions for optional filters.
MODE	Selects mode of transmit operation.
CW	Continuous wave.
USB	Upper sideband. } Receive sideband determined by setting of PBT control.
LSB	Lower sideband.
AM RCV	Amplitude modulation in receive only. Transmitter does not operate in AM mode.
GAIN	Adjusts gain of receiver circuits.
AF (small knob)	Af amplifier gain.
RF (large knob)	Rf amplifier gain.
MIC/CARRIER	In sideband operation adjusts microphone amplifier gain. In CW operation adjusts rf carrier level.
PHONES	Output jack for low-impedance (4- to 8-Ω) headphones. Connecting phones inhibits speaker and SPKR (on rear panel) outputs.
MIC	Input jack for low-impedance, dynamic microphone. Jack is also wired for ptt signal.

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
┐	1-MHz increments.
SYNC	Loads displayed frequency in nonselected vfo register to synchronize both vfo frequencies.
LOCK	Dial lock prevents tuning knob from changing frequency when rotated.
|	1-kHz increments.
┌ (left)	100-Hz increments.
┌ (right)	10-Hz increments.
POWER	Primary power switch.
Tuning knob	Frequency selection control. (Provides 200 increments per revolution for all except MHz steps at 20 increments per revolution.) Works in conjunction with switches above knob.
SPOT	In CW mode only, enables 800-Hz tone to which received CW tone is matched to spot transmitted frequency to exact received frequency.
VFO	Selects frequency-storage register.
A	A register. Transmit and receive on same frequency.
B	B register. Transmit and receive on same frequency.
RA-TB	Receive on A register frequency - transmit on B register frequency.
RB-TA	Receive on B register frequency - transmit on A register frequency.
SELECTIVITY	Controls selectivity of receiver.
PBT (small knob)	Passband tuning. Used to select USB, LSB, or CW during receive mode. Continuously varies position of passband (bandwidth selected by BW control) within 8-kHz passband of first if filter.

rotation causes the frequency to decrement in a similar fashion.

Once a chosen frequency is selected, pressing the LOCK switch to the in position electronically disables the tuning knob operation. In LOCK, rotation of the tuning knob has no effect on the frequency. To restore tuning control to the knob, press the LOCK switch to return it to the out position.

The SYNC switch is momentary and when depressed, will load the displayed frequency value from the operating vfo register into the register that is not being displayed. For example, if using register B, depressing SYNC will load the same frequency into register A. The frequency in register B can then be changed without affecting the stored value in register A.

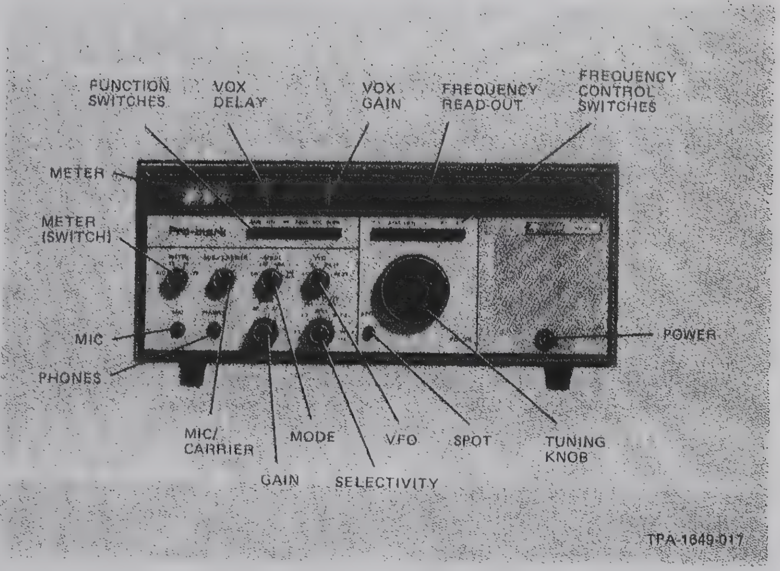
The A and B vfo registers may contain any two frequencies. Split-frequency operation is achieved by selecting RA-TB or RB-TA. With RA-TB chosen, the transceiver will receive on the frequency in the A register and transmit on the frequency in the B register. The frequency display shows the receive frequency when receiving and the transmit frequency when transmitting.

The vfo's can be set up for split-frequency operation on any two frequencies, even within separate bands.

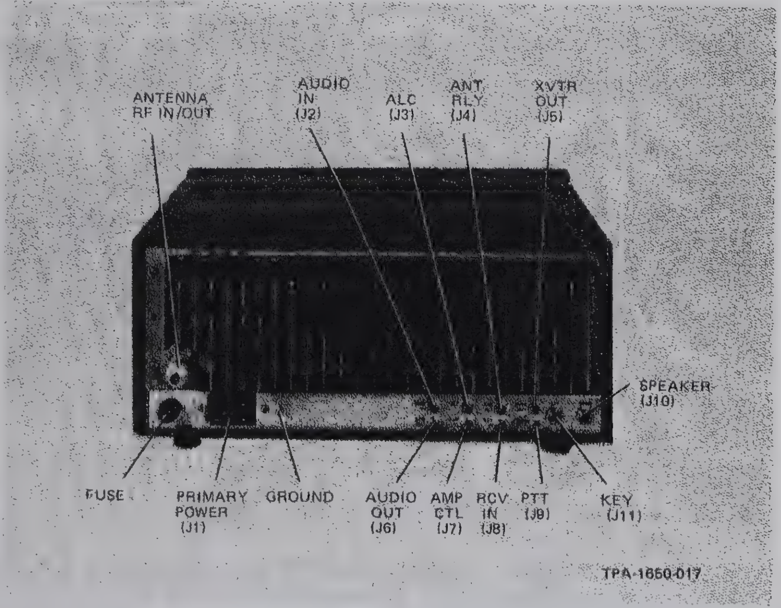
In CW operation, the SPOT switch enables an 800-Hz tone that is applied to the receiver audio output. By tuning the received signal so the CW audio frequency matches the 800-Hz SPOT frequency, the receiver frequency will be matched with the transmitted frequency.

Table 2. Front Panel Controls and Indicators.

ITEM	FUNCTION
METER (switch)	Selects signal applied to meter during transmit.
ALC	Transmitter automatic level control voltage.
VC	Collector voltage for final amplifier stage.
PF	Forward rf power sampled at amplifier output.



Front Panel Controls and Indicators
Figure 6



Rear Panel Connectors
Figure 7

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
PR	Reflected rf power sampled at amplifier output.
Meter	In receive, indicates relative signal strength in "S" units. (Rf input of 100 μV "hard" (50 μV "soft") gives S9 indication.) In transmit, indicates signal selected by METER switch.
Function switches	Selects related function when switch depressed.
MOX	Manually operated receive-to-transmit switching. Places transceiver in transmit when pressed in.
VOX	Voice operated receive-to-transmit switching. Ptt switching also operable.
NB	Noise blanker.
PROC	Speech processor.
AGC	Receiver automatic gain control.
SLOW	Selects slow AGC action when depressed; fast AGC when out. (AGC switch must be depressed for fast/slow action to be enabled).
DELAY	Adjustments for transmit-to-receive switching time delay.
CW	Delay between last key-up action and receive mode.
SSB	Delay between last microphone VOX input and receive mode.
GAIN	Adjusts levels at which receive-to-transmit switching occurs.
VOX	Voice or line audio input signals.
ANTI	Speaker-to-microphone signals.
Frequency readout	Displays frequency in 10-Hz increments.
Frequency control switches	Selects frequency increments affected by tuning knob. Continuous tuning for any increment with roll-around at end limits.

(Blowup]

394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep

21.8 kg (48 lbs) max

Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit

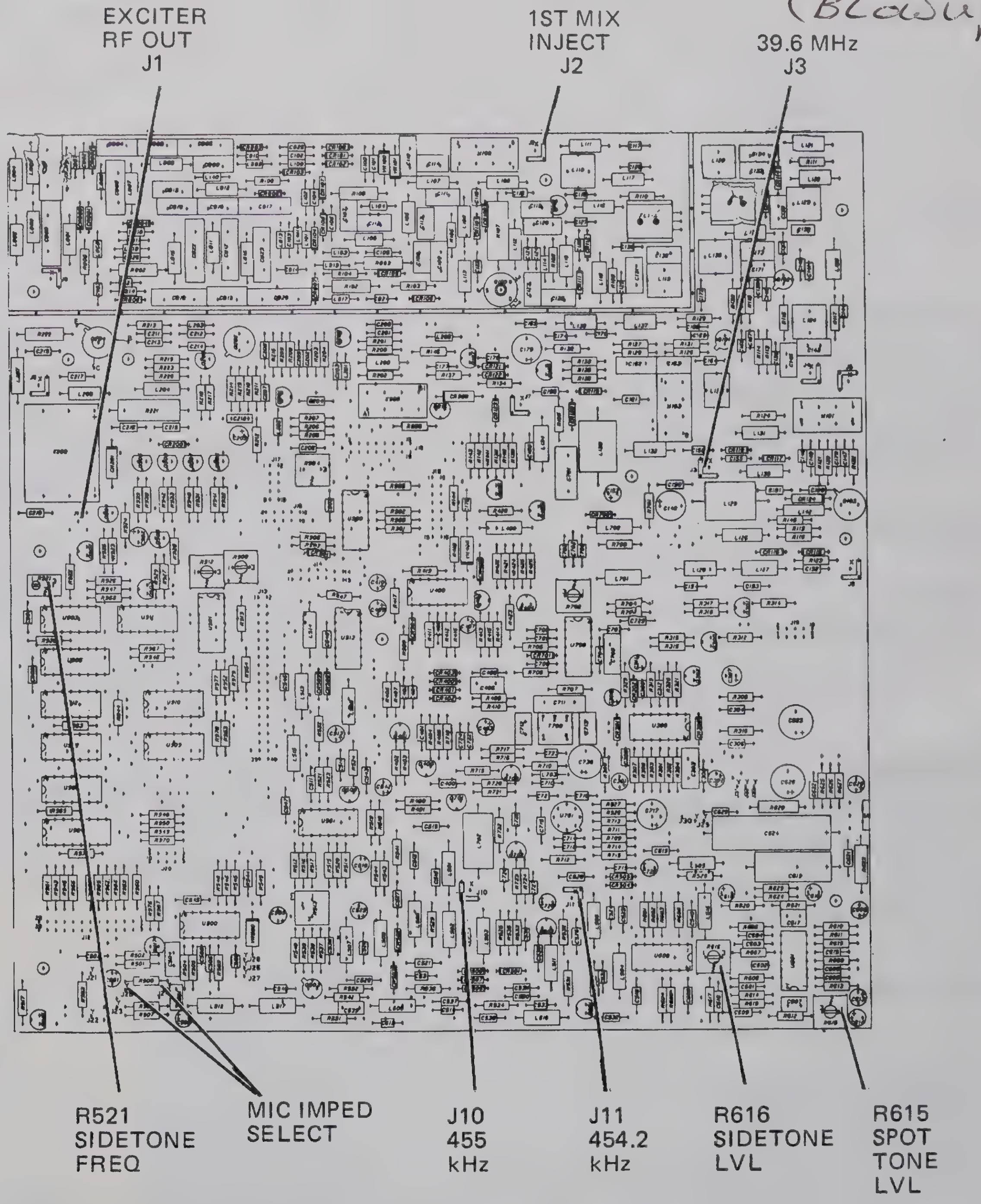
0.5 to 30.0 MHz, tunable in 10-Hz steps

USB, LSB, AM, and CW

0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)

Selectable

8 kHz	*1.7 kHz
*6 kHz	*400 Hz
2.1 kHz	*200 Hz



TPA-1683-019

SPECIAL
BLOWUP
" OF Neuro-
receptor
"Adjustment
locations "

394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep

21.8 kg (48 lbs) max

Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit

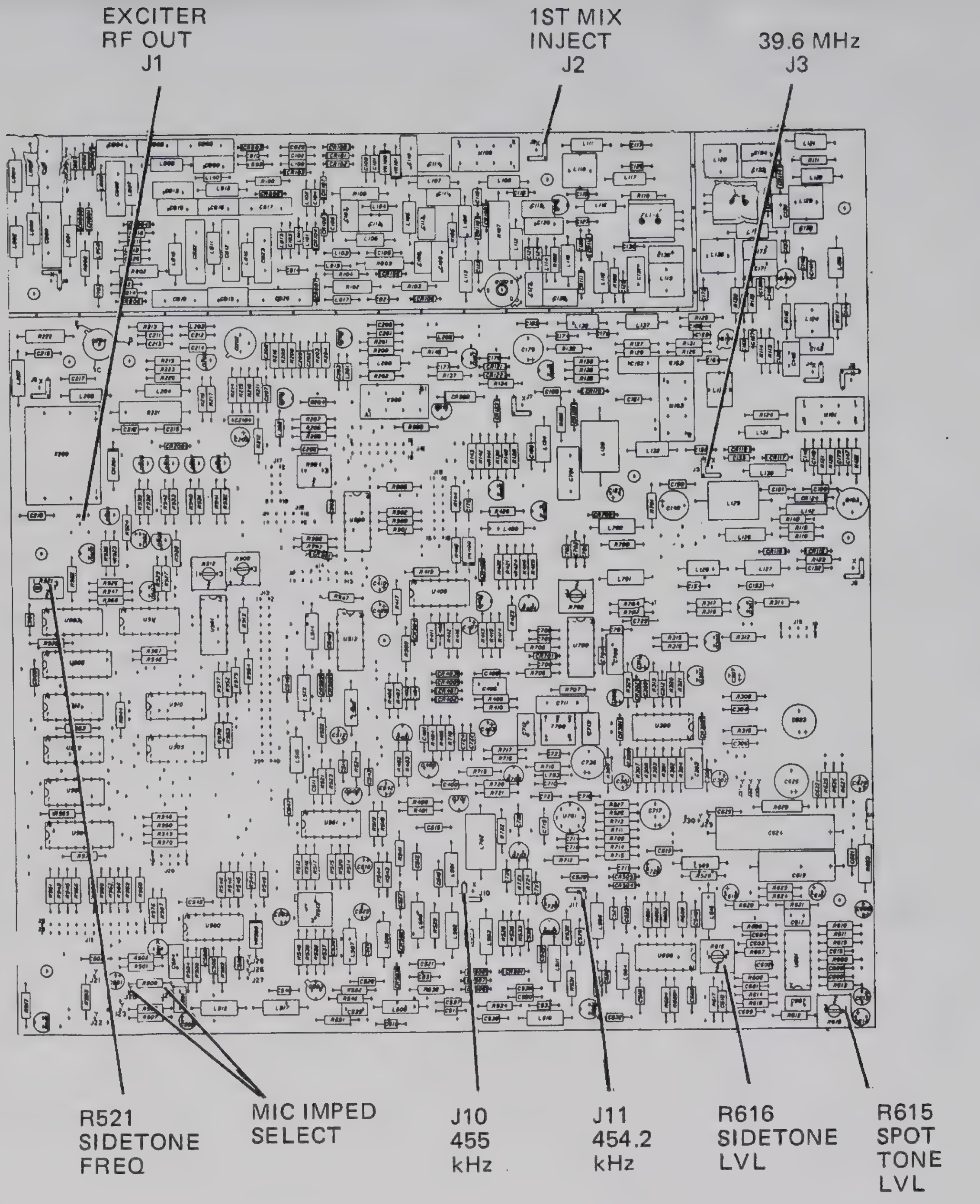
0.5 to 30.0 MHz, tunable in 10-Hz steps

USB, LSB, AM, and CW

0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)

Selectable

8 kHz	*1.7 kHz
*6 kHz	*400 Hz
2.1 kHz	*200 Hz



TPA-1683-019

Receiver-Exciter Connectors and Adjustments Locations

394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep

21.8 kg (48 lbs) max

Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit

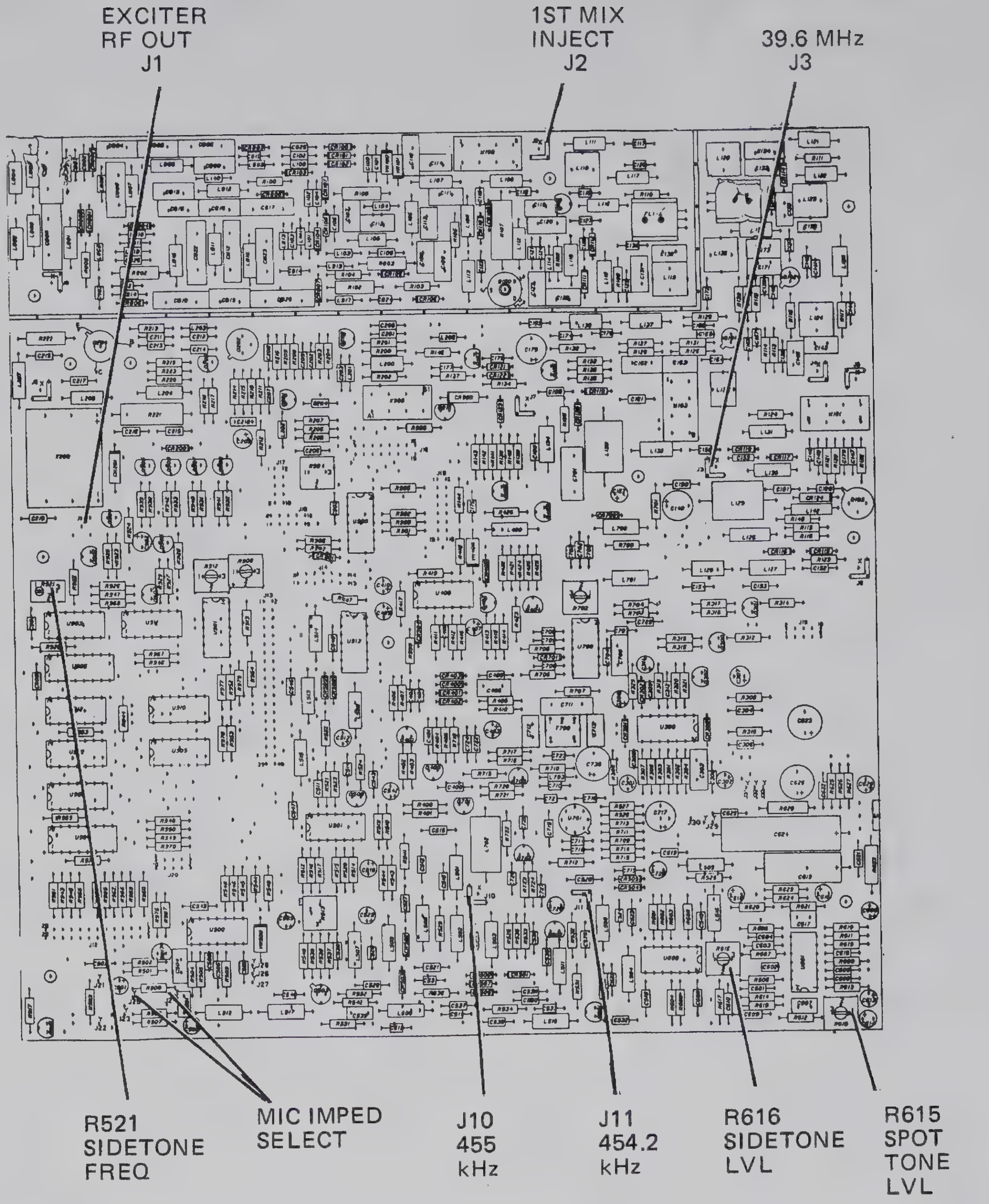
0.5 to 30.0 MHz, tunable in 10-Hz steps

USB, LSB, AM, and CW

0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)

Selectable

8 kHz	*1.7 kHz
*6 kHz	*400 Hz
2.1 kHz	*200 Hz



TPA-1683-019

Receiver Exciter Connectors and Adjustments Locations

394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep

21.8 kg (48 lbs) max

Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit

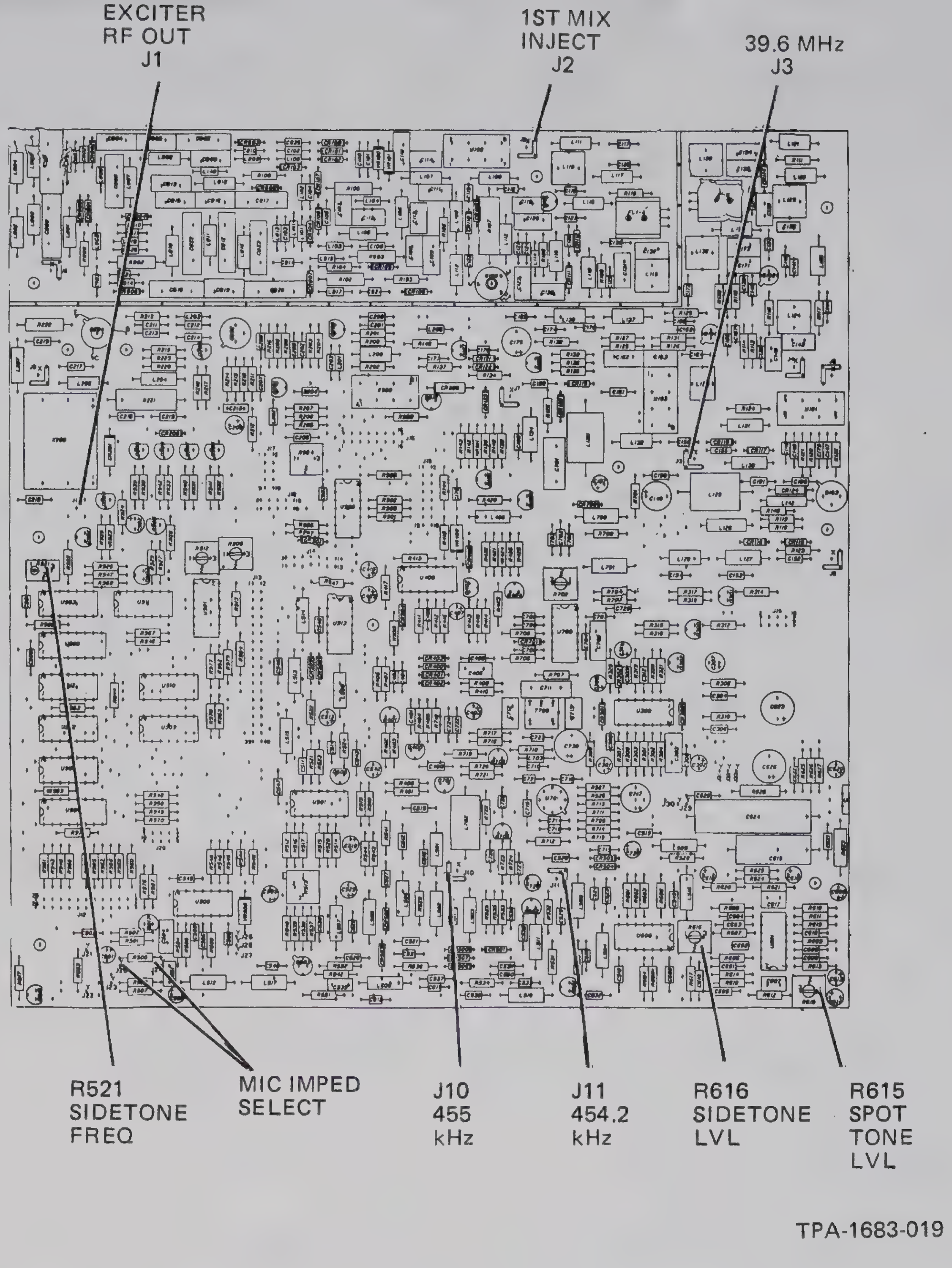
0.5 to 30.0 MHz, tunable in 10-Hz steps

USB, LSB, AM, and CW

0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)

Selectable

8 kHz	*1.7 kHz
*6 kHz	*400 Hz
2.1 kHz	*200 Hz



Receiver Exciter Connectors and Adjustments Locations

.... 394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep

.... 21.8 kg (48 lbs) max

.... Strappable for: 105, 115, 125/210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit

.... 0.5 to 30.0 MHz, tunable in 10-Hz steps

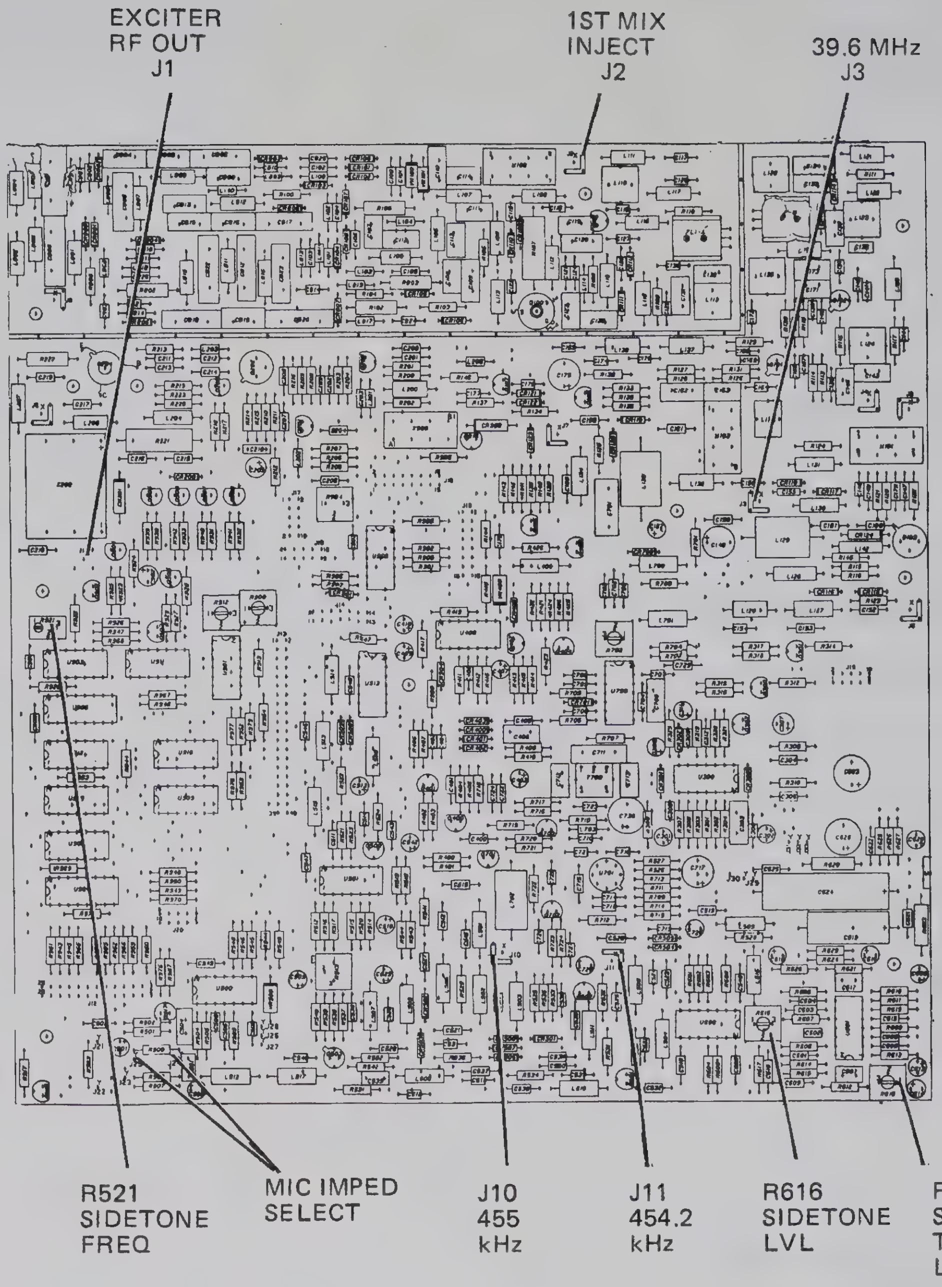
.... USB, LSB, AM, and CW

.... 0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)

.... Selectable

8 kHz	*1.7 kHz
*6 kHz	*400 Hz
2.1 kHz	*200 Hz

.... Greater than 60 dB



TPA-1683-019

Receiver-Exciter Connectors and Adjustments Locations
Figure 10

(ORIG)

523-0769877-001217
1 October 1979

owner's manual

Collins KWM-380
Transceiver

Collins Telecommunications
Products Division
Electronic Systems Group
Rockwell International
Cedar Rapids, Iowa 52406

Printed in the United States of America

introduction

This manual contains operating and installation information for the fully synthesized, all solid-state KWM-380 Transceiver. Full coverage from 29.999 99 down to 0.500 00 MHz is standard in the receiver circuits. Transmission is limited to 1.800 to 2.000, 3.500 to 4.000, 7.000 to 7.300, 14.000 to 14.350, 21.000 to 21.450, and 28.000 to 29.700 MHz in the Amateur Radio Service bands. The pll synthesizer tunes in 10-Hz increments either manually or with an optional remote keypad control. Split vfo is standard, as is the digital frequency display driven directly by the microprocessor.

Because of the uniqueness of each individual station, the installation information found here is limited in scope. In-depth information can be found in numerous publications commonly referred to by amateur radio operators.

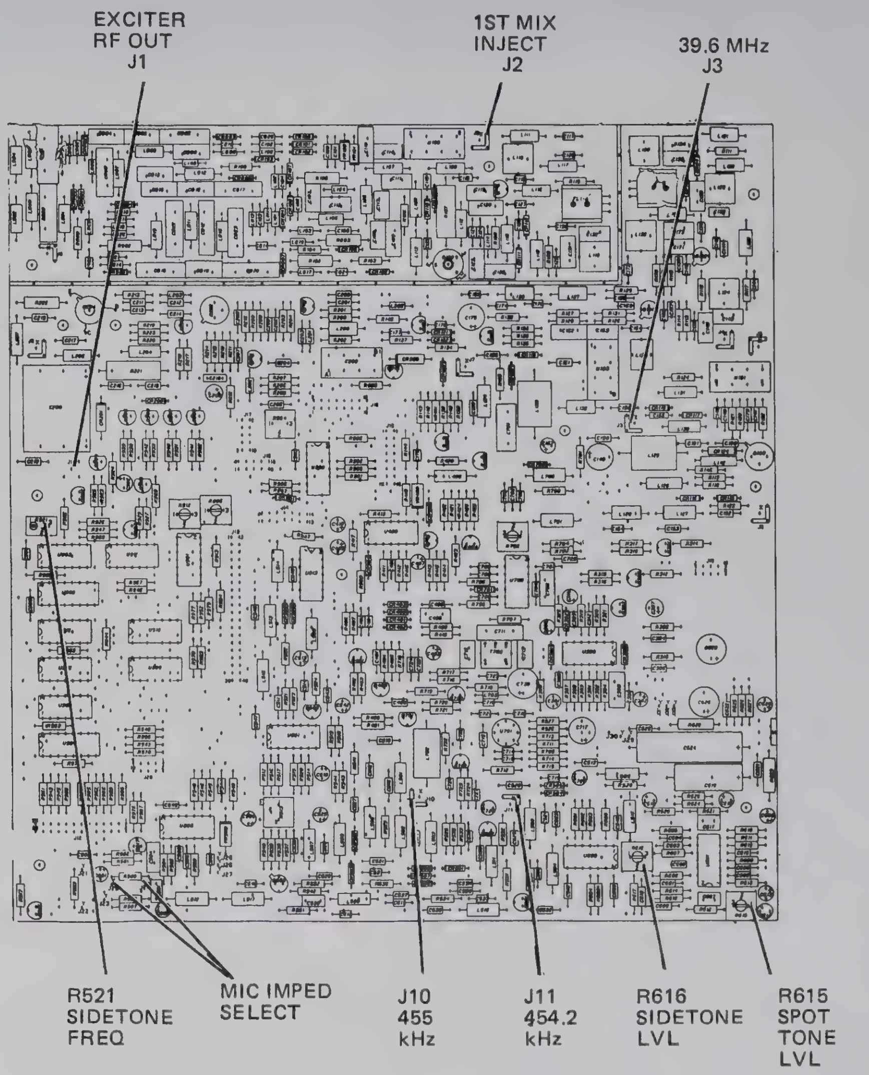
Test procedures in this manual require only simple test equipment to perform. The procedures are a guide in tracing malfunctions to a functionally related group of circuit cards. Detailed tests requiring laboratory-type test equipment and schematic diagrams are included in the KWM-380 Transceiver Service Manual, Collins publication number 523-0769878.

specifications

Physical	
Size	394 mm (15.5 in) wide, 165 mm (6.5 in) high, (does not include 25 mm (1 in) feet normally attached), 457 mm (18.0 in) deep
Weight	21.8 kg (48 lbs) max
Primary power	Strappable for: 105, 115, 125/ 210, 220, 230, 240, 250 V ±5%, 50 to 60 Hz; or 12 to 15 V dc. 120 W max in receive; 600 W max in transmit
Receiver	
Frequency	0.5 to 30.0 MHz, tunable in 10-Hz steps
Modes	USB, LSB, AM, and CW
Sensitivity	0.5 μV or better for 10 dB (s+n)/n, 2.0 to 30.0 MHz; reduced sensitivity for 0.5 to 2.0 MHz (broadcast band attenuation nominally 30 dB)
Selectivity (3-dB bandwidth)	Selectable 8 kHz *1.7 kHz *6 kHz *400 Hz 2.1 kHz *200 Hz
If and image rejection	Greater than 60 dB

---

*Optional filters



TPA-1683-019

Receiver-Exciter Connectors and Adjustments Locations
Figure 10

synthesizer output levels

Refer to figure 10 for connector locations on rcvr-extr board. The following measurements are made with an rf voltmeter.

455 kHz (J10) in SSB receive — greater than 50 mV rms.

454.2 kHz (J11) in CW receive — greater than 50 mV rms.

39.6 MHz (J3) in receive or transmit — approximately 0.5 V rms.

1st mixer injection (J2) in receive or transmit — approximately 0.5 V rms.

receiver-exciter sidetone and spot potentiometer adjustments

Refer to figure 10 for locations of sidetone frequency and level and spot tone level potentiometers. These potentiometers may be adjusted to the level or frequency desired by the operator.

DO NOT MAKE ANY OTHER ADJUSTMENTS ON THE RECEIVER-EXCITER BOARD WITHOUT THE INSTRUCTIONS AND TEST EQUIPMENT SETUP GIVEN IN THE KWM-380 SERVICE MANUAL.

microphone impedance selection

The KWM-380 is factory wired for a low-impedance microphone. A high-impedance microphone may be used, however, by removing a 270-ohm resistor and replacing it with a value between 10 and 47 kΩ that approximately matches the microphone impedance. Refer to figure 10 for the resistor location. Use caution in removing and installing the resistors. Do not apply heat from the soldering iron to the circuit board pads longer than necessary. Excessive heat can damage the circuit board.

Intermodulation distortion	-50 dB or better for two signals of -10 dB mW each, 20 kHz apart
AGC	Audio output variation not more than 8 dB for 2-μV to 100-mV open circuit rf input variation
Audio output	Not less than 3.5 W into 4-ohm load, at 1 kHz, at not more than 10% total harmonic distortion Line audio output: -10 dB mW nominal into 600 ohms Frequency response: 300 to 2400 Hz with not more than 5 dB variation
Transmitter	
Frequency	160- through 10-m amateur bands, tunable in 10-Hz steps
	160 m 1.800 - 2.000 MHz 80/75 m 3.500 - 4.000 MHz 40 m 7.000 - 7.300 MHz 20 m 14.000 - 14.350 MHz 15 m 21.000 - 21.450 MHz 10 m 28.000 - 29.700 MHz
Modes	USB, LSB, and CW
Output power	100 W pep, nominal In CW or RTTY, automatic turndown to 50 W after 10 seconds, 50 percent duty cycle, key down 15 minutes, max. With optional blower kit installed, power is 100 W average, 50 percent duty cycle, key down 1 hour, max, at 25 °C; 30 minutes, max, at 50 °C for all modes.

Unwanted signal suppression	
Carrier	-50 dB or better
Undesired sideband, 1-kHz ref	-55 dB or better
Harmonics (all)	-40 dB or better
Mixer products	-55 dB or better
Third order distortion	25 dB below each tone of two-tone test
Synthesizer accuracy and stability	Accuracy within ±5 kHz after 10 minutes warm-up when 39.6- and 455-MHz oscillators are set to within ±3 Hz Stability within ±150 Hz over temperature range of 0 to 50 °C
Rf load	50 ohms, nonreactive. Full power output with vswr of 2:1 or less. Automatic power output turndown with vswr greater than 2:1.
Audio inputs	
Microphone	Low impedance, dynamic; internal strapping for high impedance
Line	600 ohm, unbalanced; 40-mV input sufficient for full rf power output

---

MAINTENANCE

Without extensive test equipment, only a limited amount of maintenance can be performed. The following information lists the replaceable fuses and lamps, and guides in determining general functional areas in which a detected malfunction may be located. Only a multimeter and rf voltmeter are required for the tests.

replaceable fuses and lamps

Primary power (located on rear panel) — 8 A, AGC for 110 V; 4 A, AGC for 220 V.

13-volt supply (two fuses located on power supply card under chassis) — 2 A, AGC.

Panel meter lamps (wired into holder at top rear of meter) — T1 3/4, 14 V, 100 mA, type 7373.

front-panel troubleshooting

INDICATION	POSSIBLE CAUSE	TROUBLESHOOT
Rapid beeping in speaker	Synthesizer unlocked.	Check 5-, 9-, and 24-V supply outputs. Check synthesizer output levels.
No audio output	Receiver audio circuits malfunctioning.	Check 13-V supply fuses.
	Synthesizer outputs weak/absent.	Check synthesizer output levels.
	High loss in low-pass filters or antenna transfer relay.	Connect receiver antenna to RCV IN jack on rear panel. (Bypasses antenna transfer relay and low-pass filters.)
No rf output	Power amplifier circuits malfunction.	Check for 3 V rms (at full carrier gain) at J1 on rcvr-extr board. Check synthesizer output levels.

- Adjust RF and AF GAIN to desired levels.
- Select 2.2-kHz bw.
- Set PBT to second index mark to left of top center.
- Set METER to PF.
- Select unused frequency near desired operating frequency.
- Press in MOX function switch (transceiver keys).
- Adjust MIC/CARRIER to power output level desired (normally until power does not increase with continued increase in MIC/CARRIER level).
- Press MOX function to release to out (unkeyed) position.
- Tune to operating frequency.

INSTALLATION

unpacking

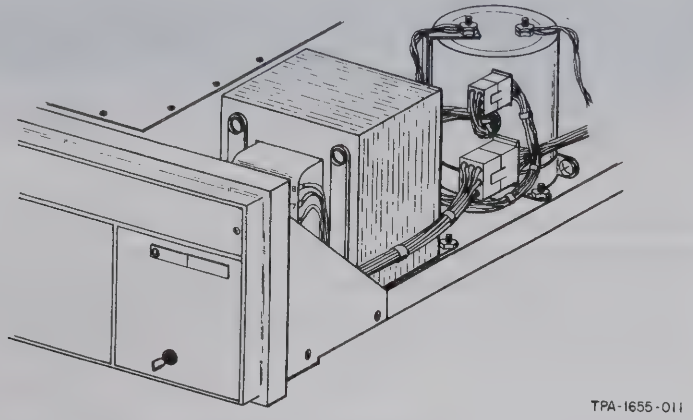
The KWM-380 is shipped in two separate cartons. One contains the power transformer, the other contains the transceiver. After carefully unpacking the cartons, check to be sure no shipping damage is evident. Should any damage be apparent, save the cartons and notify the delivery carrier immediately to file claim for damage.

power transformer installation

To eliminate the possibility of the power transformer breaking loose from the chassis and causing further damage during shipment, it is packaged separately. The transformer is quickly installed in five steps with just a 3/8-in open-end wrench, no 12 (3/8-in) nutdriver, and a Phillips screwdriver.

- Using the screwdriver, remove four screws from the bottom of the transceiver (near the rubber feet at each corner) and slide the dust cover off over the heat sink.
- Remove the front one of the two Phillips-head screws securing the front panel braces to the sides of the chassis and tilt the panel forward.
- Turn the transformer so terminals 1 through 8 face the front panel. With the nutdriver, remove the four nuts and lockwashers from the chassis mounting studs in the right front corner of the chassis and set the transformer over the studs.
- Using the wrench and nutdriver, secure the transformer to the studs with the four lockwashers and nuts.
- Electrically connect the transformer to the transceiver with the two attached polarized connectors. Reattach the front panel, then replace the dust cover.

Figure 1 shows the transformer properly mounted.



Power Transformer Installation
Figure 1

primary power requirements

WARNING

DO NOT ATTEMPT TO CHANGE VOLTAGE STRAPPING WHILE PRIMARY POWER IS APPLIED. ELECTRICAL SHOCK WILL OCCUR. DISCONNECT THE PRIMARY POWER CABLE FROM THE POWER SOURCE OR THE UNIT FIRST.

ac voltage operation

The KWM-380 will operate from various 50- to 60-Hz voltages, depending on the following internal strapping connections.

For input voltages listed, strap TB1 as follows:

WIRE	105	115	125	210	220	230	240	250
BLACK	7	7	7	6	6	5	5	4
YELLOW	3	2	1	3	2	2	1	1
RED	6	5	4	3	2	2	1	1

- Key transceiver and adjust MIC/CARRIER to power output level desired (normally until power does not increase with continued increase in MIC/CARRIER level).
- Release key and tune to operating frequency.

SSB operation

- Turn on POWER.
- Set MODE to LSB or USB, as desired for band of operation.
- Select VFO A or B.
- Adjust RF and AF GAIN to desired levels.
- Select 2.2-kHz bw.
- Set PBT to second index mark to left (LSB) or right (USB) of top center.
- Select unused frequency near desired operating frequency.
- Set METER to ALC.
- Press in VOX function switch if ptt operation not desired.
- Key transmitter and speak into microphone while adjusting MIC/CARRIER to power output level desired (normally to level where meter indicates +10 to +20 dB over S9 on S-unit scale).
- Unkey and tune to operating frequency.

RTTY operation

- Make sure microphone is disconnected.
- Turn on POWER.
- Set MODE to LSB.
- Select VFO A or B.

For CW operation, set the METER switch to PF. Key the transmitter and adjust the MIC/CARRIER control clockwise until no further increase in power is noted. A more counterclockwise position of the control will give less than this full power setting.

operating check lists

Adjustments of the KWM-380 controls will vary with individual operators. The following check lists give initial control settings for each mode of operation. After setting up the transceiver, the controls may be adjusted as desired during operation.

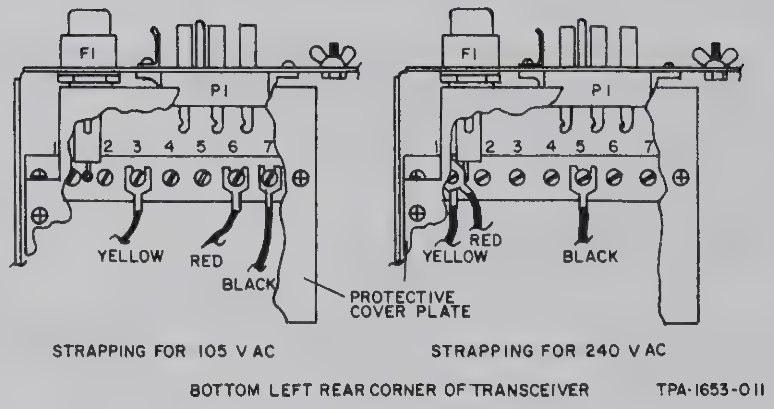
These check lists assume that the equipment is properly installed, the microphone or CW key connected, and the DELAY and GAIN controls adjusted.

CW operation

- Turn on POWER.
- Set MODE to CW.
- Select VFO A or B.
- Adjust RF and AF GAIN to desired levels.
- Select desired BW.
- Set PBT to midrange (vertical position).
- Select unused frequency near desired operating frequency.
- Set METER to PF.
- Select VOX function.

Determine the average ac voltage at the primary power outlet where the transceiver is to be used. Remove the chassis dust cover and locate the protective cover plate near the left rear corner as viewed with chassis upside down. Remove the cover plate and refer to the preceding chart to make the connections indicated for the voltage nearest the primary power outlet voltage. If the outlet voltage is approximately halfway between two voltages listed, strap TB1 for the lower voltage.

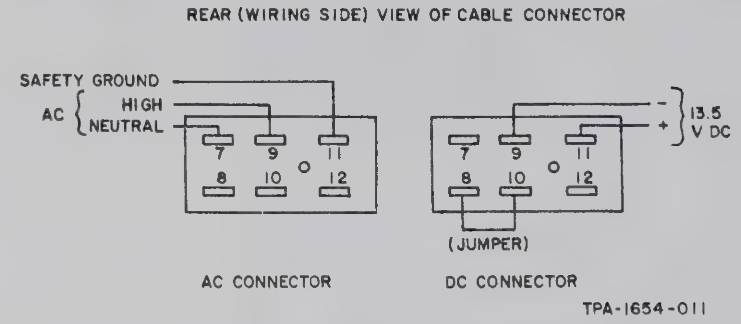
Figure 2 shows TB1 correctly strapped for 105 or 240 volts.



TB1 Strapping for 105 Volts or 240 Volts
Figure 2

dc voltage operation

The KWM-380 will also accept 12 to 15 volts dc for backup emergency power. The primary power connector must be strapped as shown in figure 3. Power requirements are nominally 3 A in receive and 20 A in transmit.



Power Connector Strapping for AC or DC Operation
Figure 3

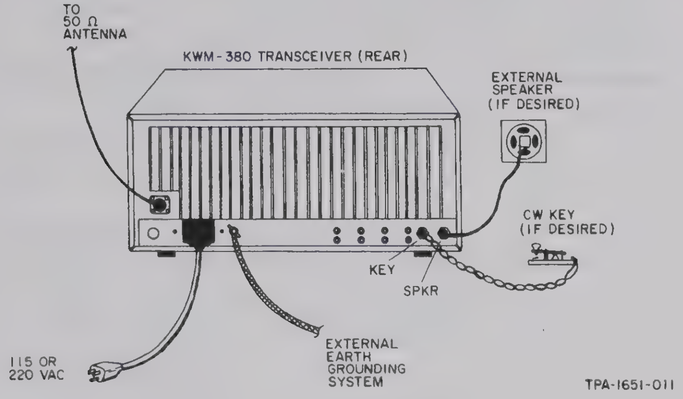
operating location

The normal operating location should be chosen so the transceiver is away from heat vents and normal airflow around it is unobstructed. Do not lay objects on top or against the sides. It is especially important that the heat sink have a free flow of air about it. An automatic turndown circuit will reduce the rf output power if the heat sink overheats. This is for self-protection of the power amplifier final output stages.

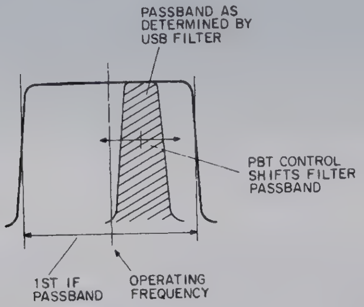
The AC-2808 Blower Kit is available for attaching to the heat sink. This blower supplies cooling air to permit normal operation in close quarters or high-duty cycle operation.

system interconnections

Figures 4 and 5 show typical hookups. Table 1 lists the signal parameters for all front and rear connectors except the primary power and rf input/output.

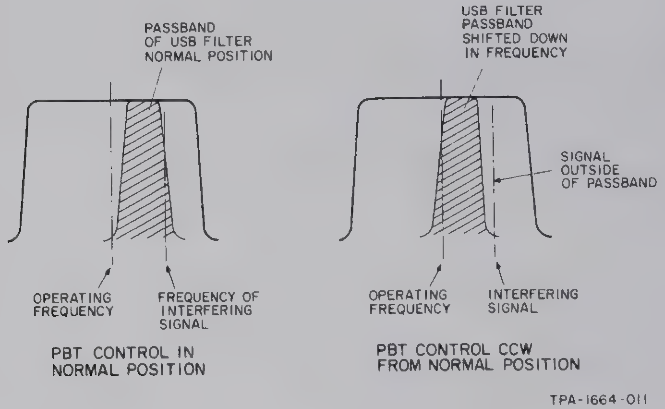

TO
50 Ω
ANTENNA
KWM-380 TRANSCEIVER (REAR)
EXTERNAL SPEAKER (IF DESIRED)
CW KEY (IF DESIRED)
KEY
SPKR
115 OR 220 VAC
EXTERNAL EARTH GROUNDING SYSTEM
TPA-1651-011

Transceiver Installation Connections
Figure 4


PASSBAND AS DETERMINED BY USB FILTER
PBT CONTROL SHIFTS FILTER PASSBAND
1ST IF PASSBAND
OPERATING FREQUENCY

TPA-1665-011

Filter Passband Positioning With PBT Control
Figure 8


PASSBAND OF USB FILTER NORMAL POSITION
OPERATING FREQUENCY
FREQUENCY OF INTERFERING SIGNAL
PBT CONTROL IN NORMAL POSITION
USB FILTER PASSBAND SHIFTED DOWN IN FREQUENCY
SIGNAL OUTSIDE OF PASSBAND
OPERATING FREQUENCY
INTERFERING SIGNAL
PBT CONTROL CCW FROM NORMAL POSITION
TPA-1664-011

Passband Tuning To Eliminate Interfering Signal
Figure 9

mic/carrier

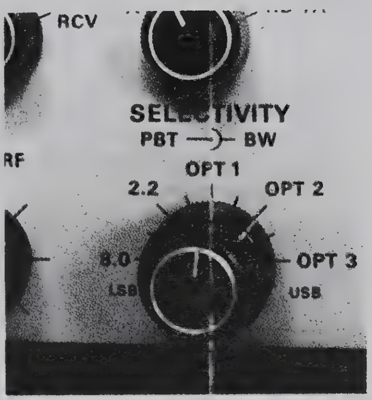
The MIC/CARRIER control adjusts the audio modulation level or the CW carrier level to control the rf output power. For voice operation, set the METER switch to ALC. Key the transmitter and speak into the microphone or say "Ahhhh" in a normal operating-voice level while adjusting the MIC/CARRIER control until the meter indicates +10 to +20 dB over S9 on the S-unit scale. A more counterclockwise position of the control will give less than this full power output setting.

The GAIN controls adjust the sensitivity to microphone input signals from the operator (VOX) or from the receiver speaker (ANTI-VOX). Set the VOX GAIN so the normal voice level used during transmitting keeps the transceiver keyed. A level too high may cause background noises to key the transmitter while a level too low will require a loud voice input to the microphone for keying. Set the ANTI-VOX GAIN to a level that prevents the microphone pickup of the speaker output from tripping the VOX circuit.

selectivity

The large (rear) BW switch controls the receive bandwidth by selecting any one of the installed filters.

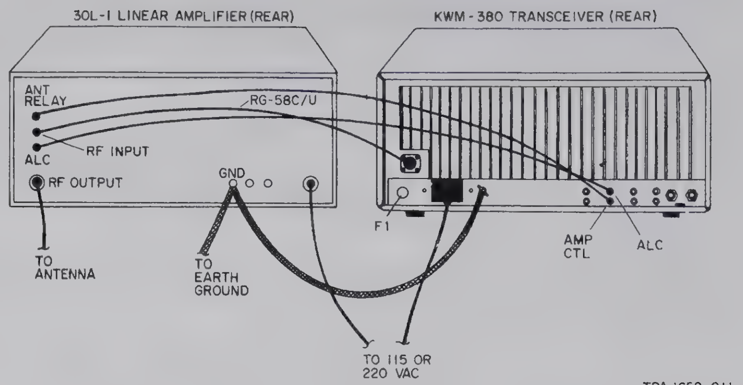
The small (front) PBT control positions the passband of the selected filter within the 10-kHz passband of the receiver first if and is used to select the desired sideband in receive. For LSB, position the pointer to near 2.2. For USB, position the pointer to near OPT 2.



TPA-1666-017

NOTE **The MODE switch does not determine which sideband is received. It only selects the desired transmit passband.**

The PBT control can shift the position of the receive selectivity by adjusting the passband above or below the normal frequency position. By adjusting the PBT control toward the left of center, the filter passband is shifted to a lower frequency. Positions right of center shift the passband to a higher frequency. Figure 8 illustrates this. Figure 9 illustrates how the passband can be tuned away from an interfering signal to put the signal outside the passband and eliminate the interference.



Transceiver and Linear Power Amplifier Installation Connections
Figure 5

Table 1. Connector Signal Parameters.

CONNECTOR	SIGNAL PARAMETER
Microphone (mates with PJ-068)	Tip—ptt line; ground to transmit
	Ring—microphone audio; low-impedance input (270 Ω), approx 5 mV in for full power output
	Barrel—common ground
Headphones (mates with PJ-055)	Tip—receiver audio; 4- to 8-Ω impedance, up to 4-W output
	Barrel—ground
External SPKR (mates with PJ-055)	Tip—receiver audio; 4- to 8-Ω impedance, up to 4-W output
	Barrel—ground
CW KEY (mates with PJ-055)	Tip—keying line; ground to transmit
	Barrel—ground
J2 Line audio in (mates with phono plug)	600 Ω, unbalanced; 40-mV input produces 100-W rf output

Table 1. Connector Signal Parameters (Cont).

CONNECTOR	SIGNAL PARAMETER
J3 ALC (mates with phono plug)	Input for negative ALC voltage from external power amplifier
J4 Antenna relay (mates with phono plug)	External access to receiver contacts of internal antenna transfer relay. Internally jumpered to J8. (Cut jumper if used.)
J5 Transverter (mates with phono plug)	Approximately 200-mW (100-mW, min) output from exciter into 50-ohm load. (To obtain output, connect this line to dc ground through a 1-mH rf choke.)
J6 Line audio out (mates with phono plug)	600 Ω, unbalanced; -10 dB mW at AGC threshold. Level is independent of audio gain control.
J7 Ampl control (mates with phono plug)	Normally open relay contacts; contacts grounded in transmit. 2 A, 28 V dc or 0.75 A, 115 V ac capacity.
J8 Rcvr antenna input (mates with phono plug)	Direct input to receiver front end. Bypasses transmit low-pass filters and antenna transfer relay. Internally jumpered to J4. (Cut jumper if used.)
J9 Push-to-talk (mates with phono plug)	Ground to place transceiver in transmit. (Line is connected to +5 V through 10-kΩ resistor.)

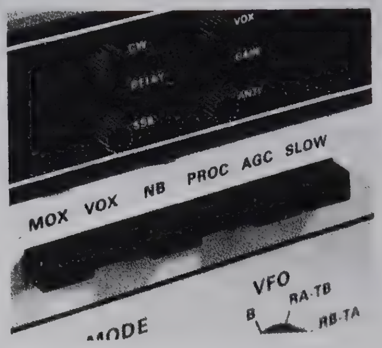
grounding

The importance of a good ground system cannot be overemphasized. All units of the system should have ground interconnections through heavy wire (#12 AWG or larger) or ground strap (6-mm (1/4-in) wide or larger) between ground lugs. Use as short a length of ground wire or braid as practical between units or external ground.

Connect the KWM-380 ground lug on the rear to a good earth or water-pipe ground.

Before using a water-pipe ground, check to make sure that no plastic, rubber, or other such insulating sections will interrupt

function switches



TPA-1668-017

Depressing the MOX or VOX switch selects manual- or voice-operated keying, respectively. The rear panel PTT jack (J9), when grounded, will key the transmitter regardless of MOX or VOX selection.

When pressed to the in position, the MOX switch keeps the transceiver continuously keyed. For normal transmit-receive operation, the MOX switch must be out. With MOX and VOX both out, the transceiver is keyed with the microphone ptt switch. Selecting VOX enables voice keying in sideband or CW keying in CW.

The AGC function can be enabled by depressing the AGC switch. The out position inhibits AGC operation. Release time of the AGC is controlled by the SLOW switch. The in position selects a slow release time. This is normally used in SSB operation. Fast AGC release, the switch out position, is more useful for CW reception.

The optional noise blanker and speech processor circuits, when installed, are selected by depressing the respective NB or PROC switch to the in position. The noise blanker reduces or eliminates pulse-type noise, such as from automobile ignition systems, from the receiver audio output. The speech processor increases the ratio of average to peak power in the rf output signal. This increases talk power and may be desired in DX operation.

The DELAY controls adjust the time the transceiver is held in the transmit mode after the voice input or CW keying signal is removed. Clockwise adjustment of either control increases the delay between the last input and automatic transmit-to-receive switching. Independently set these controls as desired for the preferred delay times.

Table 3. Rear Panel Connectors.

ITEM	FUNCTION
Antenna	Rf connector (type S0-239) for coaxial cable connection to antenna coupler.
Fuse	Primary power fuse (8 A for 110 V, 4 A for 220 V).
J1	Primary power connector.
Ground	Stud for earth-ground connection.
AUD IN (J2)	Input for 600-ohm, unbalanced line audio.
ALC (J3)	Negative ALC input signal from external power amplifier.
ANT RLY (J4)	Receive contacts of internal antenna transfer relay. (Jumpered to RCV IN (J8) if separate receive antenna not used.)
XVTR OUT (J5)	Exciter output signal for use with transmitting converter.
AUD OUT (J6)	Output for 600-ohm, unbalanced line audio.
AMP CTL (J7)	Relay contacts for tr-switching external power amplifier. (Contacts grounded in transmit mode.)
RCV IN (J8)	Receiver front end signal input. Bypasses antenna transfer relay and transmit low-pass filters. (Jumpered to ANT RLY (J4) if separate receive antenna not used.)
PTT (J9)	Push-to-talk switch input. Ground to command transmit operation.
KEY (J10)	CW key input.
SPKR (J11)	Output for 4- to 8-ohm speaker. Disconnects internal speaker when external speaker connected. (Inhibited when headphones connected to PHONES jack on front panel.)

the electrical continuity to ground. Install a jumper around any insulating sections found. Use heavy copper wire or ground braid and metal pipe clamps.

antennas

The antenna is one of the most important parts in the performance of any radio communications system. System performance is directly related to the efficiency of the antenna. Because each individual installation has unique characteristics, various types of antennas, their characteristics, and installation information cannot be covered in this manual. A number of excellent reference works on antennas are available.

The KWM-380 is designed to operate into a nonreactive rf load of 50 ohms. Impedance mismatches producing vswr's lower than 2:1 are acceptable. For vswr's 2:1 or greater, the transceiver power amplifier output is automatically reduced in proportion to the reflected power.

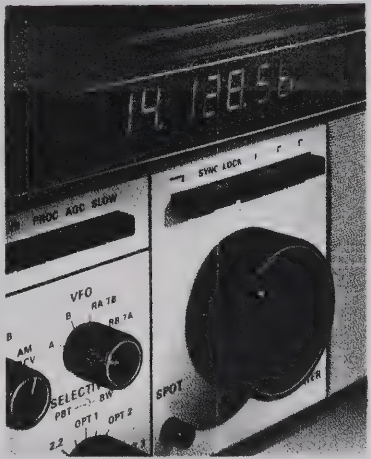
OPERATION

introduction

Controls on the KWM-380 have been labeled so that their function is self-explanatory. After referring to figures 6 and 7 and tables 2 and 3, many operators will need no further explanation. The following paragraphs summarize operation of several of the controls and give check lists for initial control settings for each operating mode.

frequency selection

The large tuning knob and row of switches immediately above it control the transceiver frequency selection. When power is applied to the transceiver, the frequency is automatically set to 15.000 00 MHz. Frequency data is not retained in the vfo registers when power is turned off.



TPA-1667-017

There is no need for a bandswitch since selection of the MHz tuning increment permits tuning from 0 to 29 MHz in 1-1/2 turns of the knob. This rate is effective for the MHz digits only. Selecting other increments automatically switches the tuning rate to 200 steps per turn. For example, selecting the 100-Hz increment gives 20 kHz per revolution of the tuning knob.

When a switch is depressed to select a frequency increment to be changed, that and all higher increments will change as the tuning knob rotates. For example, if the 100-Hz increment is selected, the 10-Hz digit remains where last set. Rotating the tuning knob clockwise causes the 100-Hz digits to increment up through 9, index the 1-kHz digit by one, and roll around to 0 to continue incrementing toward 9 again. Counterclockwise

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
BW (large knob)	Selects filter bandwidth.
8.0	8.0-kHz filter (for AM, also selects optional 6-kHz AM filter if installed).
2.2	2.2-kHz filter (for normal SSB).
OPT 1, 2, 3	Three positions for optional filters.
MODE	Selects mode of transmit operation.
CW	Continuous wave.
USB	Upper sideband. Receive sideband determined by setting of PBT control.
LSB	Lower sideband.
AM RCV	Amplitude modulation in receive only. Transmitter does not operate in AM mode.
GAIN	Adjusts gain of receiver circuits.
AF (small knob)	Af amplifier gain.
RF (large knob)	Rf amplifier gain.
MIC/CARRIER	In sideband operation adjusts microphone amplifier gain. In CW operation adjusts rf carrier level.
PHONES	Output jack for low-impedance (4- to 8-Ω) headphones. Connecting phones inhibits speaker and SPKR (on rear panel) outputs.
MIC	Input jack for low-impedance, dynamic microphone. Jack is also wired for ptt signal.

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
┐	1-MHz increments.
SYNC	Loads displayed frequency in nonselected vfo register to synchronize both vfo frequencies.
LOCK	Dial lock prevents tuning knob from changing frequency when rotated.
|	1-kHz increments.
┌ (left)	100-Hz increments.
┌ (right)	10-Hz increments.
POWER	Primary power switch.
Tuning knob	Frequency selection control. (Provides 200 increments per revolution for all except MHz steps at 20 increments per revolution.) Works in conjunction with switches above knob.
SPOT	In CW mode only, enables 800-Hz tone to which received CW tone is matched to spot transmitted frequency to exact received frequency.
VFO	Selects frequency-storage register.
A	A register. Transmit and receive on same frequency.
B	B register. Transmit and receive on same frequency.
RA-TB	Receive on A register frequency - transmit on B register frequency.
RB-TA	Receive on B register frequency - transmit on A register frequency.
SELECTIVITY	Controls selectivity of receiver.
PBT (small knob)	Passband tuning. Used to select USB, LSB, or CW during receive mode. Continuously varies position of passband (bandwidth selected by BW control) within 8-kHz passband of first if filter.

rotation causes the frequency to decrement in a similar fashion.

Once a chosen frequency is selected, pressing the LOCK switch to the in position electronically disables the tuning knob operation. In LOCK, rotation of the tuning knob has no effect on the frequency. To restore tuning control to the knob, press the LOCK switch to return it to the out position.

The SYNC switch is momentary and when depressed, will load the displayed frequency value from the operating vfo register into the register that is not being displayed. For example, if using register B, depressing SYNC will load the same frequency into register A. The frequency in register B can then be changed without affecting the stored value in register A.

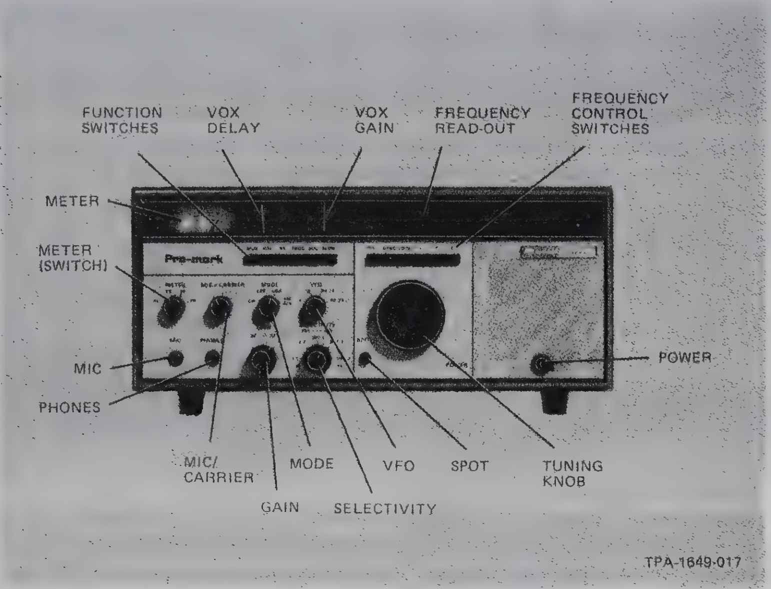
The A and B vfo registers may contain any two frequencies. Split-frequency operation is achieved by selecting RA-TB or RB-TA. With RA-TB chosen, the transceiver will receive on the frequency in the A register and transmit on the frequency in the B register. The frequency display shows the receive frequency when receiving and the transmit frequency when transmitting.

The vfo's can be set up for split-frequency operation on any two frequencies, even within separate bands.

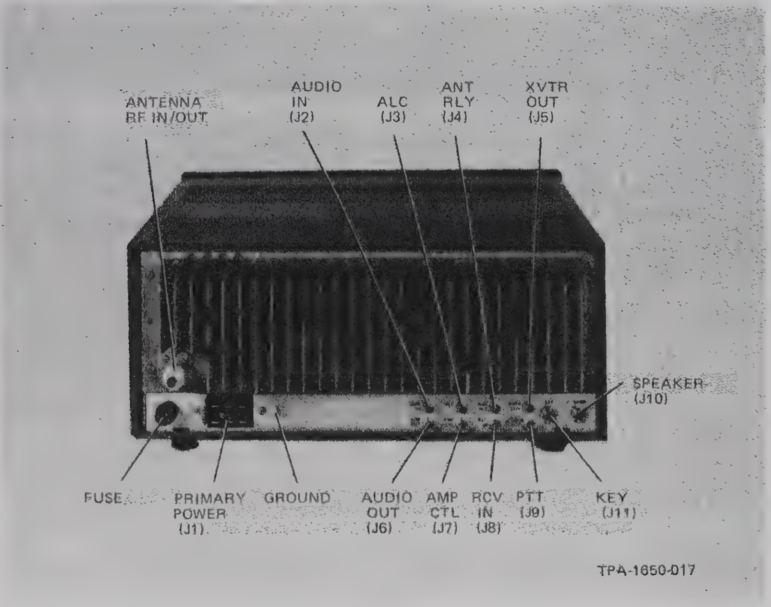
In CW operation, the SPOT switch enables an 800-Hz tone that is applied to the receiver audio output. By tuning the received signal so the CW audio frequency matches the 800-Hz SPOT frequency, the receiver frequency will be matched with the transmitted frequency.

Table 2. Front Panel Controls and Indicators.

ITEM	FUNCTION
METER (switch)	Selects signal applied to meter during transmit.
ALC	Transmitter automatic level control voltage.
VC	Collector voltage for final amplifier stage.
PF	Forward rf power sampled at amplifier output.



Front Panel Controls and Indicators
Figure 6



Rear Panel Connectors
Figure 7

Table 2. Front Panel Controls and Indicators (Cont).

ITEM	FUNCTION
PR	Reflected rf power sampled at amplifier output.
Meter	In receive, indicates relative signal strength in "S" units. (Rf input of 100 μV "hard" (50 μV "soft") gives S9 indication.) In transmit, indicates signal selected by METER switch.
Function switches	Selects related function when switch depressed.
MOX	Manually operated receive-to-transmit switching. Places transceiver in transmit when pressed in.
VOX	Voice operated receive-to-transmit switching. Ptt switching also operable.
NB	Noise blanker.
PROC	Speech processor.
AGC	Receiver automatic gain control.
SLOW	Selects slow AGC action when depressed; fast AGC when out. (AGC switch must be depressed for fast/slow action to be enabled).
DELAY	Adjustments for transmit-to-receive switching time delay.
CW	Delay between last key-up action and receive mode.
SSB	Delay between last microphone VOX input and receive mode.
GAIN	Adjusts levels at which receive-to-transmit switching occurs.
VOX	Voice or line audio input signals.
ANTI	Speaker-to-microphone signals.
Frequency readout	Displays frequency in 10-Hz increments.
Frequency control switches	Selects frequency increments affected by tuning knob. Continuous tuning for any increment with roll-around at end limits.

Rockwell International

Collins Telecommunications
Products Division
Electronic Systems Group

523-0769877-001217

10-79

Printed in U.S.A.

ROCKWELL-COLLINS

KWM-380

Owner's Manual

Pro-mark™

The Mark of the Professional

Rockwell International

Collins Telecommunications
Products Division
Electronic Systems Group

523-0769877-001217

10-79

Printed in U.S.A.

ROCKWELL-COLLINS

KWM-380

Owner's Manual

Pro-mark™
The Mark of the Professional

523-0769877-001217
1 October 1979

owner's manual

Collins KWM-380 Transceiver

Collins Telecommunications
Products Division
Electronic Systems Group
Rockwell International
Cedar Rapids, Iowa 52406

Printed in the United States of America

523-0769877-001217
1 October 1979

owner's manual

Collins KWM-380 Transceiver

Collins Telecommunications
Products Division
Electronic Systems Group
Rockwell International
Cedar Rapids, Iowa 52406

Printed in the United States of America